170305

WORK PLAN

AMERICAN CHEMICAL SERVICE, INC.

GRIFFITH, INDIANA

VOLUME I - TECHNICAL SCOPE OF WORK

JULY 1985

* * * Company Confidential * * *

Prepared for:

U.S. Environmental Protection Agency
Emergency and Remedial Response Branch
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Document No. 160-WP1-WP-BDSK-2
W.A. No. 61-5LJ7.0

PERFORMANCE OF REMEDIAL RESPONSE
ACTIVITIES AT UNCONTROLLED HAZARDOUS
WASTE SITES (REM II)

U.S. EPA CONTRACT NO. 68-01-6939

WORK PLAN
FOR
AMERICAN CHEMICAL SERVICE, INC.
GRIFFITH, INDIANA

EPA Work Assignment No. 61-5LJ7.0

REM II Document No. 160-WP1-WP-BDSK-2

Prepared By: ______________________________ Date: ________________
James M. Burton, P.E.
Site Manager

Approved By: ______________________________ Date: ________________
John W. Hawthorne, P.E.
Region V Manager

Approved By: ______________________________ Date: ________________
David F. Doyle, P.E.
Technical Operations Manager

Approved By: ______________________________ Date: ________________
Jonathan G. Curtis, P.E.
Finance & Administration Manager

WORK PLAN APPROVAL

DATE: ______________________

FROM: ______________________
Remedial Project Manager

TO: ______________________
Regional Project Officer

WA NO: ______________________

SITE NAME: ______________________

ACTIVITY: ______________________

___ Approval for entire work plan:

Budget $______________________

LOE Hours ______________________

Estimated Completion Date ______________________

___ Partial Approval:

Tasks Approved ______________________

Budget $______________________

LOE Hours ______________________

___ Not Approved:

COMMENTS: ____

____

By: __________________ Date: __________
RPM

___ Approved as submitted
___ Approved with changes
___ Approved pending funding Approved By:__________________Date:______
___ Partial Approval Name:
___ Not Approved Regional Project Officer, USEPA

cc: W.M. Kaschak, Project Officer, USEPA
N. Willis, Regional Coordinator, USEPA

___ Approved as submitted
___ Approved with changes
___ Approved pending funding Approved By:__________________Date:______
___ Partial Approval U. Joiner
___ Not Approved Contracting Officer, USEPA

cc: W.M. Kaschak, Project Officer, USEPA
N. Willis, Regional Coordinator, USEPA

WORK PLAN

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

This Work Plan has been prepared to guide the conduct of the Remedial Investigation/Feasibility Study for the American Chemical Services, Inc. (ACS) site located in Griffith, Indiana. The Pazmey Corporation property (formerly Kapica Drum, Inc.), and the Griffith Landfill property are also included within the total site boundary. The vast majority of on-site investigative work proposed in the work plan will be on ACS property since it is this property that has a documented hazardous waste disposal history and is on the NPL list. However, review of existing information revealed references to hazardous wastes being disposed of in Griffith Landfill by ACS. There were also references concerning drum and drum cleaning residues from the operation at Kapica Drum, Inc., being disposed of on ACS property adjacent to the Kapica Drum property and in the Griffith Landfill. It is also likely that drum and drum cleaning residues were disposed of by Kapica Drum, Inc., on its own property.

The Work Plan describes the site background, technical approach to site investigation and feasibility study activities, schedule for project execution, budget estimate and project staffing for conducting an RI/FS at the ACS site. The major objective of the RI/FS is to evaluate the potential extent and magnitude of on-site contamination and based on the RI work, recommend a cost-effective, viable remedial action alternative for mitigating the hazards posed by the contamination present at the site.

The remedial investigation field work will result in the collection of 100 source characterization samples from the documented and suspected waste burial and soil contamination areas at the site. In addition, 173 site characterization samples (groundwater, surface water, sediment private well and geotechnical) will be collected during the remedial investigation field work.

The Feasibility Study will include the initial screening of candidate remedial alternatives and subsequent detailed evaluation of selected alternatives. Technical, environmental, economic, and institutional criteria will be utilized to perform the alternative evaluations. A conceptual design and associated cost estimates will be prepared for the recommended remedial strategy.

The estimated time for completion of the RI/FS is 26 months from the date that authorization to proceed is given. This includes 14 months for the remedial investigation and 12 months beyond the end of the RT ← I phase for the completion feasibility study.

SECTION 1

INTRODUCTION

1.1 SITE LOCATION AND HISTORY

The American Chemical Service, Inc., (ACS) site is located at 420 South Colfax Avenue in Griffith, Indiana (Figure 1-1). Although the site name is American Chemical Services, Inc., it also includes the Griffith Landfill and the property previously owned by Kapica Drum, Inc., (now owned by Pazmey Corporation)(Figure 1-2). The vast majority of on-site investigative work proposed in the work plan will be on ACS property since it is this property that has a documented hazardous waste disposal history and is on the NPL list. However, review of existing information revealed references to hazardous wastes being disposed of in Griffith Landfill by ACS. There were also references concerning drum and drum cleaning residues from the operation at Kapica Drum, Inc., being disposed of on ACS property adjacent to the Kapica Drum property and in the Griffith Landfill. It is also likely that drum and drum cleaning residues were disposed of by Kapica Drum, Inc., on its own property; however, there is no data that substantiates this suspicion.

ACS began operations in May 1955, solely as a solvent recovery firm. Later, the company also began a limited chemical manufacturing operation. At this time, Mr. James Tarpo is president of ACS and Messrs. John and James Murphy are the firm's vice presidents.

From 1955 to 1975 American Chemical Services, Inc., disposed of a variety of hazardous wastes at various locations on its property. The hazardous wastes disposed of on ACS property were primarily from on-site chemical manufacturing and solvent reclamation operations. Some waste was accepted from off-site sources for incineration in the ACS on-site incinerator. The incinerator-generated ash was then disposed of on ACS property.

The Griffith Landfill is still an active sanitary landfill and has been in operation since the 1950's. As stated previously it has been included in the work plan because it has been reported (Response to U.S. EPA Request For Information sent to ACS-10/18/84) that hazardous

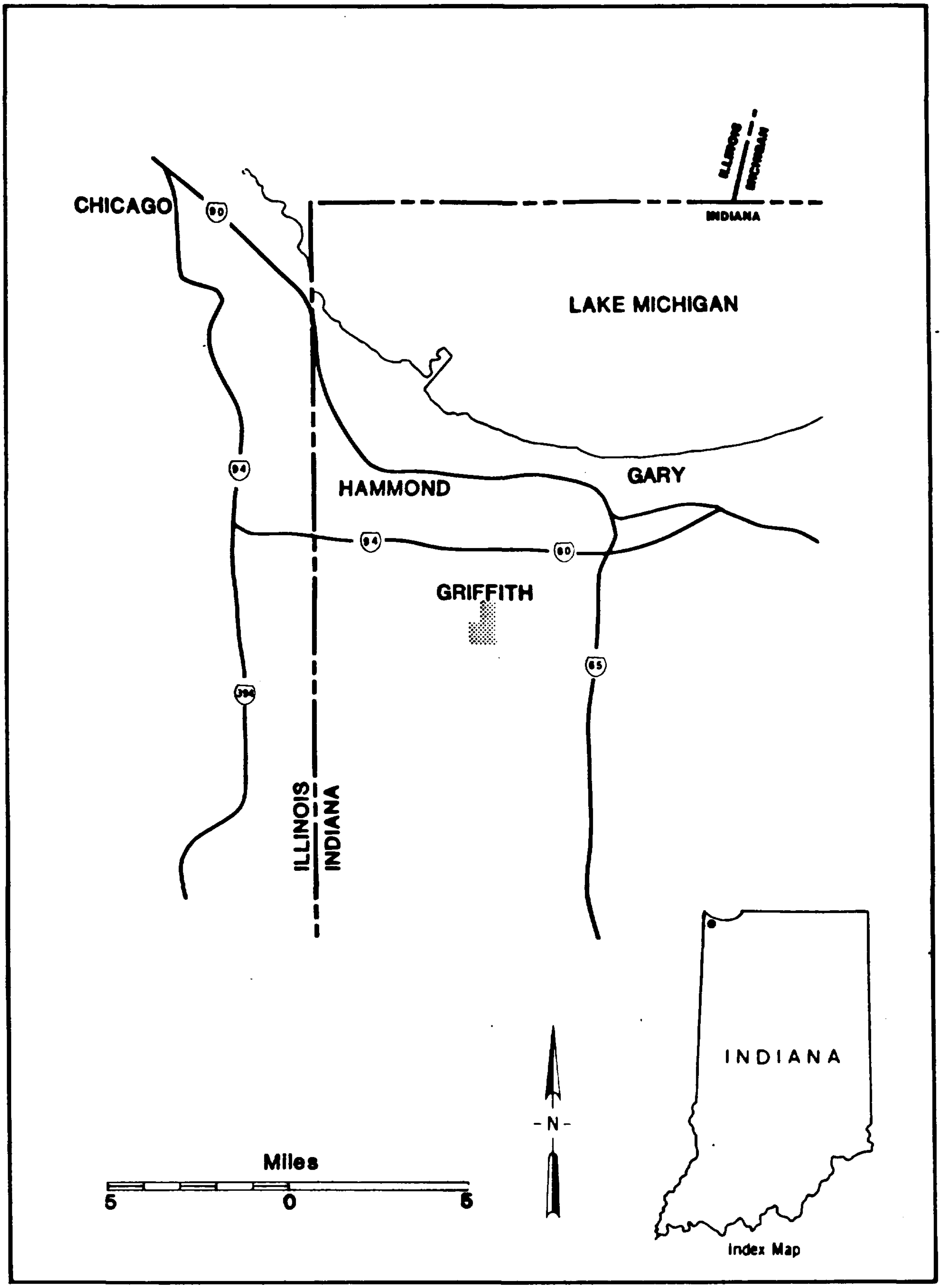


Figure 1-1 Location Map American Chemical Service Site

Copies

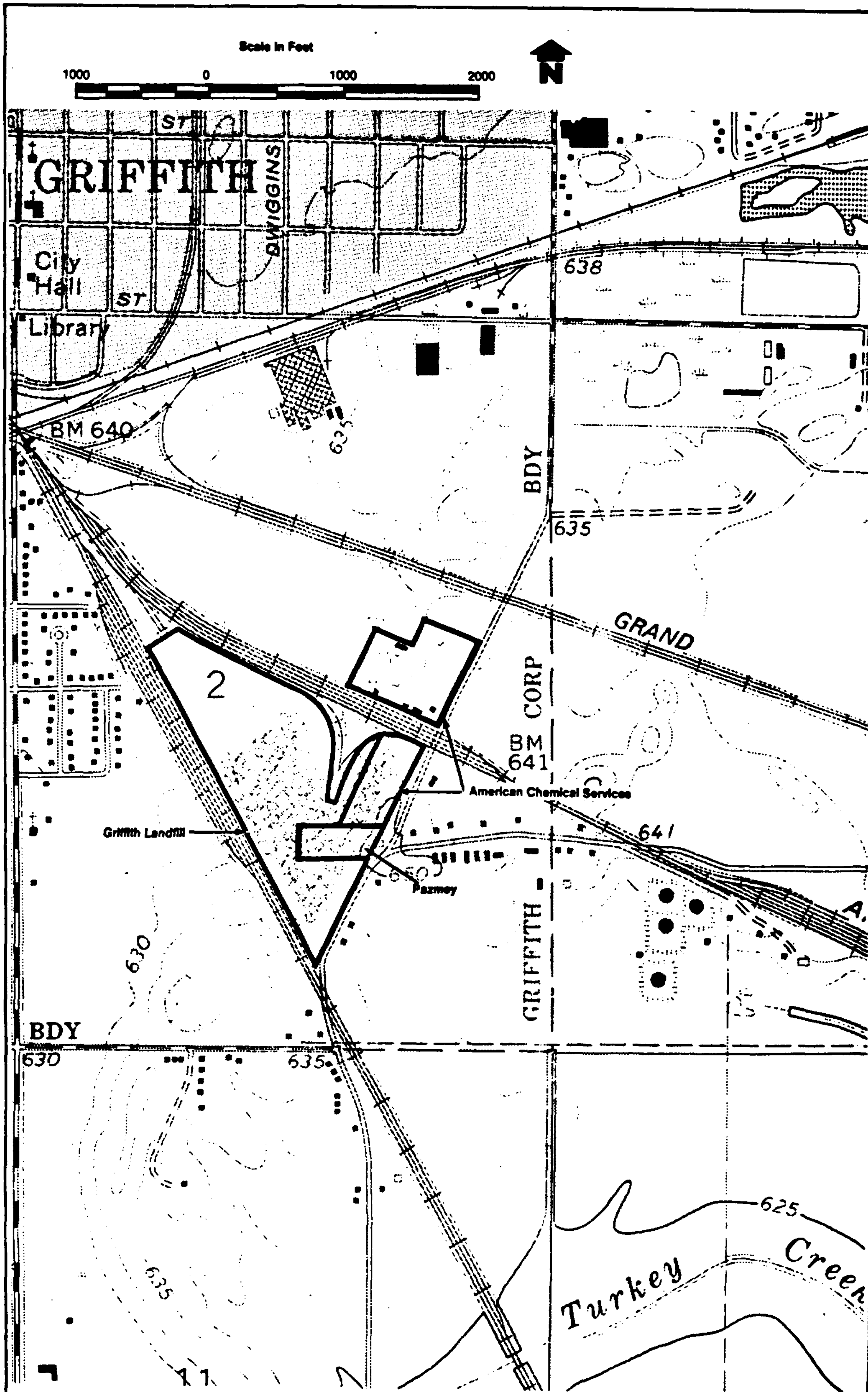


FIGURE 1-2 SITE MAP

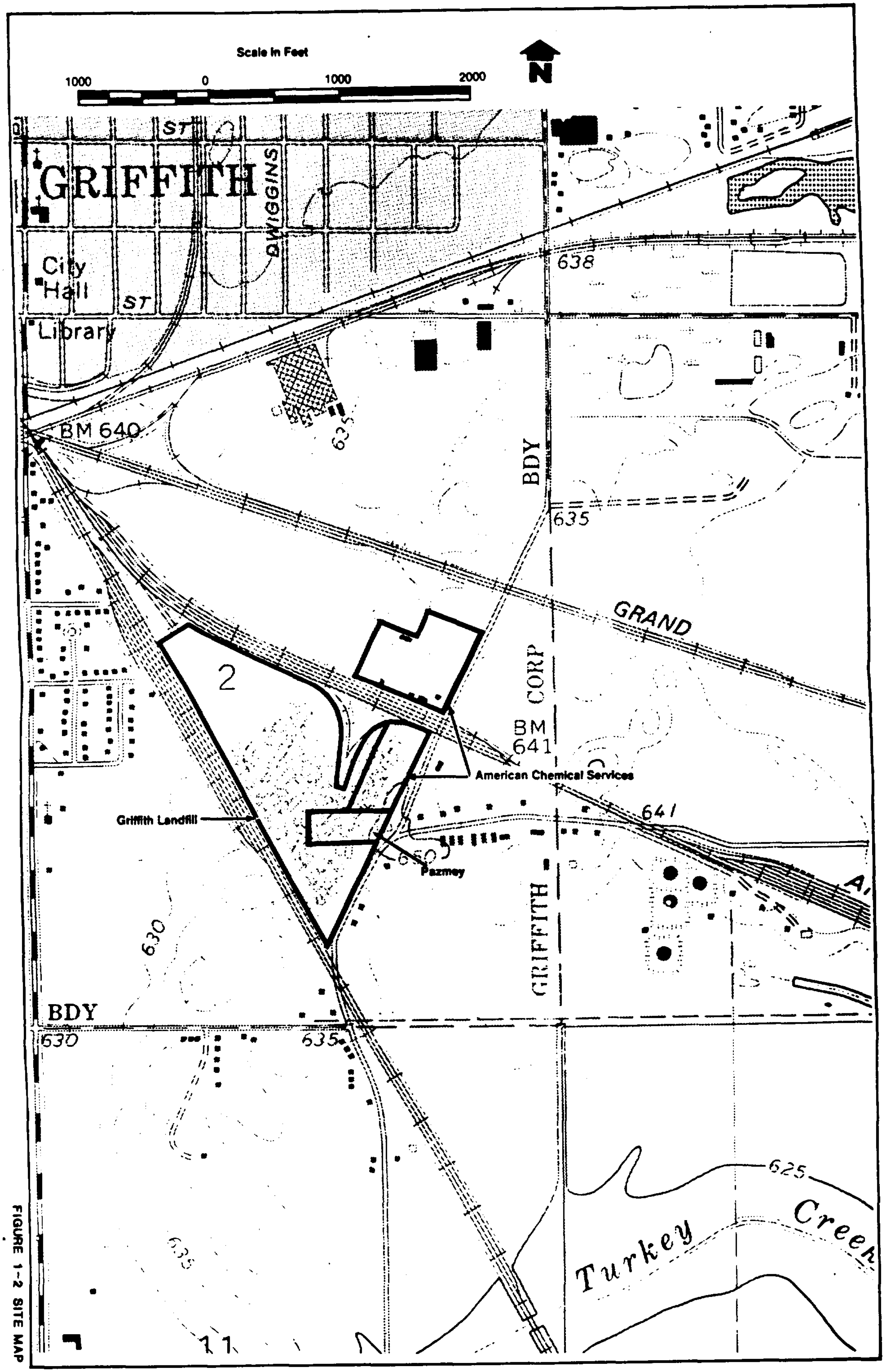


FIGURE 1-2 SITE MAP

wastes from American Chemical Services, Inc., and Kapica Drum, Inc., were disposed of in the landfill prior to the promulgation of RCRA.

Kapica Drum, Inc., (now under the new ownership of Pazmey Corporation) has been in operation since 1951. Kapica Drum, Inc., was a drum reconditioning facility which generated drum residues and rinse waters from cleaning drums that contained hazardous wastes. Again, as previously stated, it has been included in the work plan because it has been reported (Response to U.S. EPA Request For Information sent to ACS-10/18/84) that hazardous waste drum rinse water has been discharged on the ACS and Griffith Landfill property.

Figure 1-3 summarizes the interrelationship between American Chemical Service, Inc., Kapica Drum, Inc., and the Griffith Landfill based on a review of available information. For a more detailed site history refer to the American Chemical Service, Inc., Initial Site Evaluation Report (Document Number 160-WP1-RT-AUJD-1).

1.2 Site Status and Project Type

American Chemical Service, Inc., is an actively operating facility. The 1983 notifier's listing indicates treatment, storage and disposal activities at the site. American Chemical Service, Inc.'s EPA I.D. number is IND016360265. The June, 1983 Hazard Ranking System scores for this facility were as follows:

1) Groundwater Route Score	59.86
2) Surface Water Route Score	8.89
3) Air Route Score	0
4) Overall Average Score	34.98

American Chemical Service, Inc., is an enforcement-lead site and this Work Plan is for a Remedial Investigation/Feasibility Study (RI/FS) project.

1.3 Overview

This Work Plan has been prepared in accordance with the requirements of the Work Plan Memorandum (Document No. 160-WP1-WM-ARLB-1) and the Work Assignment (No. 61-5LJ7.0) for the ACS site. The purpose of this RI/FS is to evaluate the extent and magnitude of on-site contamination and based upon this RI, recommend cost-effective, viable, remedial action alternative(s) for mitigating the hazard posed by the contamination at the site. Specific objectives of the RI/FS include:

- o Determine if the ACS site poses a risk to public health or the environment.

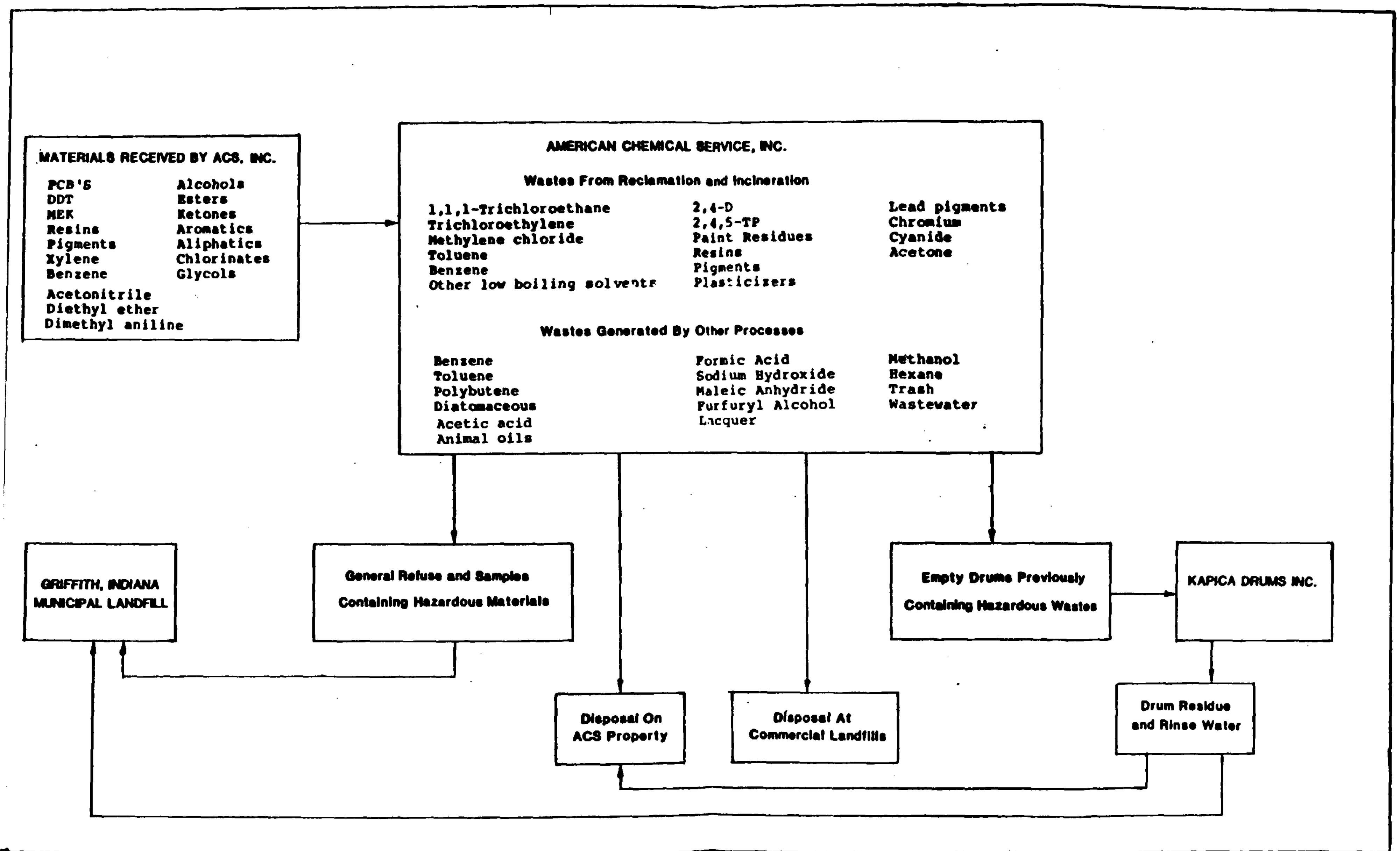


FIGURE 1-3 WASTE DISPOSAL FLOWCHART

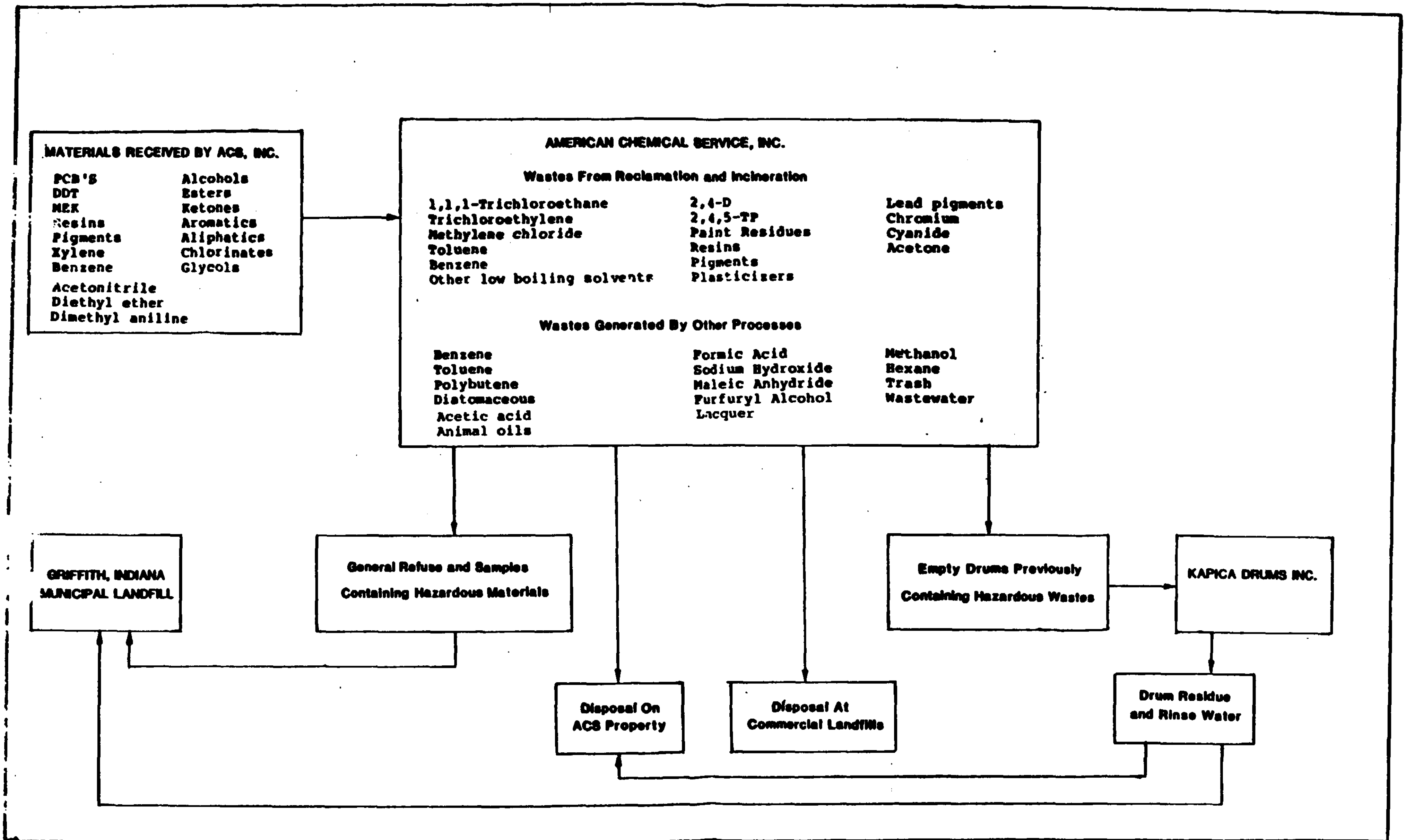


FIGURE 1-3 WASTE DISPOSAL FLOWCHART

- Determine the characteristics, extent and magnitude of contamination at the site.
- Define the pathways of contaminant migration from the site.
- Define on-site physical features and facilities that could affect contaminant migration, containment, or cleanup.
- Develop viable remedial action alternatives.
- Evaluate and screen remedial action alternatives.
- Recommend the most cost-effective remedial action alternative which adequately protects health, welfare and the environment.
- Prepare a conceptual design of the recommended alternative.

This Work Plan presents the site background, technical approach to site investigation and feasibility study activities, schedule for project execution, budget estimate, and project staffing for conducting an RI/FS at the ACS site in Griffith, Indiana. A draft work plan will be submitted for U.S. EPA and Indiana State Board of Health (ISBH) for review. After completion of the review, the REM II site team will meet with the agencies to discuss the draft document. Review comments will be incorporated in a final work plan document, which will be submitted within 10 working days following receipt of written agency comments. Copies of all subcontract agreements will be forwarded to the U.S. EPA site officer for information purposes.

The ACS Work Assignment (No. 61-5L37.0) identified the following tasks for the RI/FS:

<u>Remedial Investigation</u>

Task 1 - Description of Current Situation (Level I investigation)
Task 2 - Plans and Management
Task 3 - Site Investigation (Levels II and III)
Task 4 - Site Investigation Analysis
Task 5 - Laboratory and Pilot Scale Studies
Task 6 - Reports
Task 7 - Additional Requirements

<u>Feasibility Study</u>

Task 1 - Develop Screening Criteria
Task 2 - Evaluation of Remedial Action Alternatives
Task 3 - Feasibility Report
Task 4 - Conceptual Design

The tasks discussed in the RI/FS work assignment have been incorporated in the appropriate section of this RI/FS Work Plan and are discussed below. The first section of the RI/FS Work Plan presents information concerning the location, history, and the status of the ACS site. The second section summarizes the results of the initial site evaluation as reported in the Initial Site Evaluation Report (Document No. 160-WP1-RT-AVJD-1). Included in this section are a site description, contamination problem definition, contaminant migration, environmental health effects, and initial remedial measures. The third section describes remedial action alternatives that could be applied at the ACS site and identifies associated data gaps. The fourth section describes the various tasks that will be performed as part of the remedial investigation activity. The fifth section describes the work elements for the feasibility study. The sixth section presents the project schedule. The seventh section presents information on the staff that will be preparing the ACS Work Plan. The eighth and ninth sections discuss subcontracting plans and special equipment needs required for the RI/FS work. Volume 2 of the RI/FS Work Plan presents the estimated labor hours and associated project costs.

SECTION 2

INITIAL SITE EVALUATION

The purpose of Section 2 is to summarize the information presented in the Initial Site Evaluation for the American Chemical Service, Inc., site (Document Number 160-WP1-RT-AUJD-1). For detailed discussion and data refer to that document.

2.1 SITE DESCRIPTION

2.1.1 Environmental Setting

The American Chemical Service, Inc. (ACS) site is located 1/2 mile southeast of Griffith, Indiana, in the northeast 1/4 of the southeast 1/4, Section 2, Township 35 North, Range 9 West, Lake County, Indiana. The site includes the ACS property (19 acres) the Griffith Landfill on the southwest (31 acres) and Pazmey Corporation (formerly Kapica Drum, Inc.) on the south (2 acres). The Chesapeake and Ohio Railroad bisects the site. Surface elevations range from 635 to 650 feet above Mean Sea Level (MSL).

Griffith is located in the Calumet Lacustrine Plain which is characterized by 40 to 250 feet of Wisconsinan Age surficial deposits that composed the bed of Glacial Lake Chicago. The Calumet Lacustrine Plain is an area of low relief with three relict shorelines containing dunes (some up to 40 ft. high).

Bedrock consists of 4000 feet of Cambrian to Devonian Age limestones, dolomite, sandstones, and shales overlying Pre-Cambrian granitic basement rock. The Detroit River and Traverse Formations, composed of limestone, underly the Town of Griffith. The sedimentary rocks are gently flexed to form a saddle-like structure as part of the Kankakee Arch. Dip is 5 to 7 feet/mile to the southeast.

Drainage of surface waters in Griffith is to the north and the Little Calumet River is the major drainageway. The sediments of the Calumet Lacustrine Plain are fine lake silts and clays, paludal deposits of muck and peat, and great expanses of beach and dune sand. Sand and gravel deposits also occur in outwash and in till inclusions, and clay-rich tills are also present in the area. The three beach ridges in the area were formed as falling lake levels in Glacial Lake Chicago slightly stabilized after the Valparaiso Moraine was breached. Each beach ridge formation was accompanied by nearshore foredunes.

The topography at the site is almost level in the portion north of the railroad and rises slowly from 630 to 645 feet above MSL in the southern half of the site. Griffith Landfill has excavated about 30 feet of soil to the west of the ACS Off-Site Drum Containment

Area near the southeast boundary of the ACS property, thus modifying the gently sloping topography. A marsh to the north of the landfill and west of American Chemical Service property has a surface elevation of about 625 feet. The two major soils in the area are the Plainfield fine sand and the Maumee loamy fine sand with average hydraulic conductivities of 1.42×10^{-2} cm/sec.

There are no natural streams in the area of the site, but a marsh does exist immediately to the west of the northern half of the site. Man-made drainage ditches form the western border of the site and eventually enter Turkey Creek one mile to the south. A natural surface water drainage pond is located just to the west of the western boundary of the site, and a fire pond, a pond in which rainwater is collected to be used in case of a fire at the facility, is located about 200 feet to the east. Turkey Creek, a small stream, flows about 1 mile south of the site and the Little Calumet River is located three miles to the north. In general, the sediments underlying Griffith contain a great reservoir of fresh water and also have a great potential for contamination (Indiana DNR, 1975).

Surficial deposits are 130 feet thick in the vicinity of American Chemical Services. They are divided into three units. Unit 1 is a gray and brown sand 10 to 14 feet thick, Unit 2 is a gray clay 10 to 24 feet thick, and Unit 3 is a sand and gravel layer that extends to bedrock. Bedrock consists of Devonian Limestone. Installation of four shallow groundwater monitoring wells and review of local boring records by the Ecology and Environment, Inc. The U.S. EPA FIT team, confirmed these findings.

Hantke, Hill and Reshkin, (1975) summarized the surficial geology of Lake and Porter counties. Unit 1, was described as medium to coarse silty sand with interbedded beach gravels, and hydraulic conductivity ranging from 2.8×10^{-3} to 4.7×10^{-7} cm/sec. Unit 2 was estimated to have a vertical hydraulic conductivity of 3.3 x 10-7 cm/sec and to allowing slow leakage of groundwater from Unit 1 to Unit 3. Unit 3 hydraulic conductivity was estimated to range from 9.4 x 10-3 to 4.7 x 10-2 cm/sec with a storage coefficient of 0.003, indicative of partially confined conditions. Unit 4, a clay unit 15 to 30 feet thick overlying bedrock found regionally was not indicated to be at the site.

At the ACS site, Unit 1 is an unconfined aquifer with a water table that ranges from 3 to 10 feet below the surface. Flow is to the northwest along the Unit 1/Unit 2 contact. Unit 3 is the main aquifer in the area and regionally, flow in Unit 3 is to the northeast. (Ecology and Environment, 1980, FIT team report, 1982 and Hantke, Hill and Reshke.) Flow directions at the site in Unit 3 are not documented.

Although it has been previously stated that groundwater flow is to the northwest at the site in Unit 1, it should be noted that because Turkey Creek flows 1 mile to the south and the Little Calument River located 3 miles ot the north of the site, a groundwater flow divide may exist somewhere between the two surface water bodies. Also, due to recent and continued excavations of up to 30 feet of soil from the Griffith Landfill, current information regarding site specific groundwater flow direction is suspect.

2.1.2 Site History

A detailed site chronology for the ACS site is included in the ACS Initial Site Evaluation Report (Document No: 160-WP1-RT-AVJD-1). The chronology is divided into the following categories:

- American Chemical Service, Inc. Property Ownership History
- Indiana State Board of Health Site Inspections/Activities and Correspondence Concerning American Chemical Service, Inc.
- U.S. EPA Region V Site Inspections/Activities and Correspondence Concerning American Chemical Service, Inc.
- Correspondence From and To American Chemical Service, Inc.
- Correspondence From the Congress of the United States and Indiana State Legislature Concerning American Chemical Service, Inc.
- Chronology of Newspaper Articles Concerning American Chemical Service, Inc.
- Chronological Summary of American Chemical Service, Inc. On-site Events

The pertinent site history presented in the ACS Initial Site Evaluation Report is summarized in the following paragraphs.

The maximum amount of property that has ever been under American Chemical Services, Inc., control since the company was founded in 1955, is approximately 52 acres. Over the years the amount of property under ACS control has decreased. Two acres of the approximately 39 acre tract south of the C&O railroad were sold to Mr. John Kapica (Kapica Drum, Inc.) and subsequently resold by Mr. Kapica to Mr. Pazdro (Pazmey Corp.). An additional 31 acres of the 39 acre tract south of the C&O railroad were sold to the City of Griffith for use as a sanitary landfill. At the present time, American Chemical Service, Inc. owns 6 acres of the original 39 acre tract south of the C&O railroad and approximately 9 acres north of the C&O railroad for a total of approximately 15 acres. In addition, ACS leases 4 acres north of the C&O railroad from the C&O railway company.

April 1972 is the earliest documentation of Indiana State Board of Health (ISBH) regulatory activity at in the ACS site. Between April, 1972 to September, 1973 the ISBH attempted to achieve improved waste handling, spill prevention measures and site maintenance. ISBH continued involvement with ACS from September 1974 to September 1975 in response to reports that the company was discharging chemicals to the sanitary sewer and dumping chemicals on-site. There was very little ISBH activity concerning ACS during the period September 1975 to December 1982. The first step to list American Chemical Service, Inc. as a NPL site was taken in December 1982 and continued through April 1984 when data was supplied by Techlaw.

U.S. EPA activities concerning the American Chemical Service, Inc. site began in February 1980 and continue to the present. During this period, two on-site investigations were conducted in order to provide information for the Hazard Ranking System. During May of 1980, sampling was conducted at ACS by the U.S. EPA Environmental Emergency and Investigation Branch. Monitoring well installation and sampling was conducted in November 1982 by a U.S. EPA contractor.

2.2 CONTAMINATION PROBLEM DEFINITION

2.2.1 Waste Disposed of at Site

Based on available information there are four documented waste burial locations, one suspected waste burial location and four suspected contaminated soil areas. Table 2-1 summarizes the locations and corresponding waste types and Figure 2-1 shows their locations.

2.2.2 Toxicity of Contaminants

All of the contaminants have been on the site for ten or more years. Chemical characteristics of the contaminants as they exist now are unknown; therefore, an accurate interpretation of relative toxicity is not possible at this time. As part of the remedial investigation an endangerment assessment will be conducted that will address the toxicity of contaminants.

2.2.3 Degree of Site Contamination

Documented evidence of the degree of site contamination is limited to the results of two on-site sampling events. During May 1980, samples were collected and analyzed by the U.S. EPA. The results of that analysis revealed organic compounds in the soil and water from a leachate pool near the ACS Off-Site Containment Area. During November 1982, a U.S. EPA contractor installed four monitoring wells on ACS property and collected groundwater samples from the wells. The samples from the two wells near the ACS Off-Site Containment Area

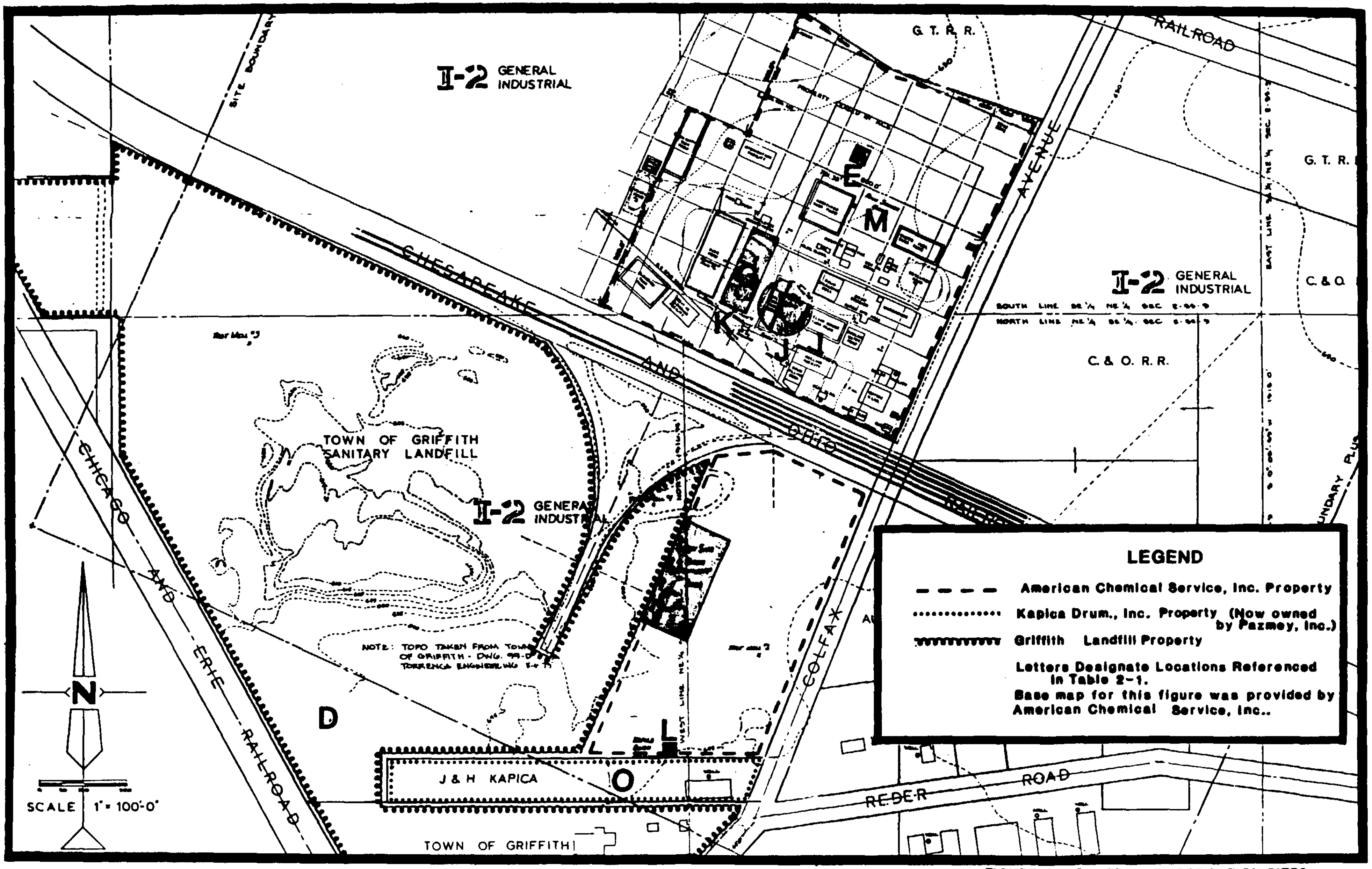
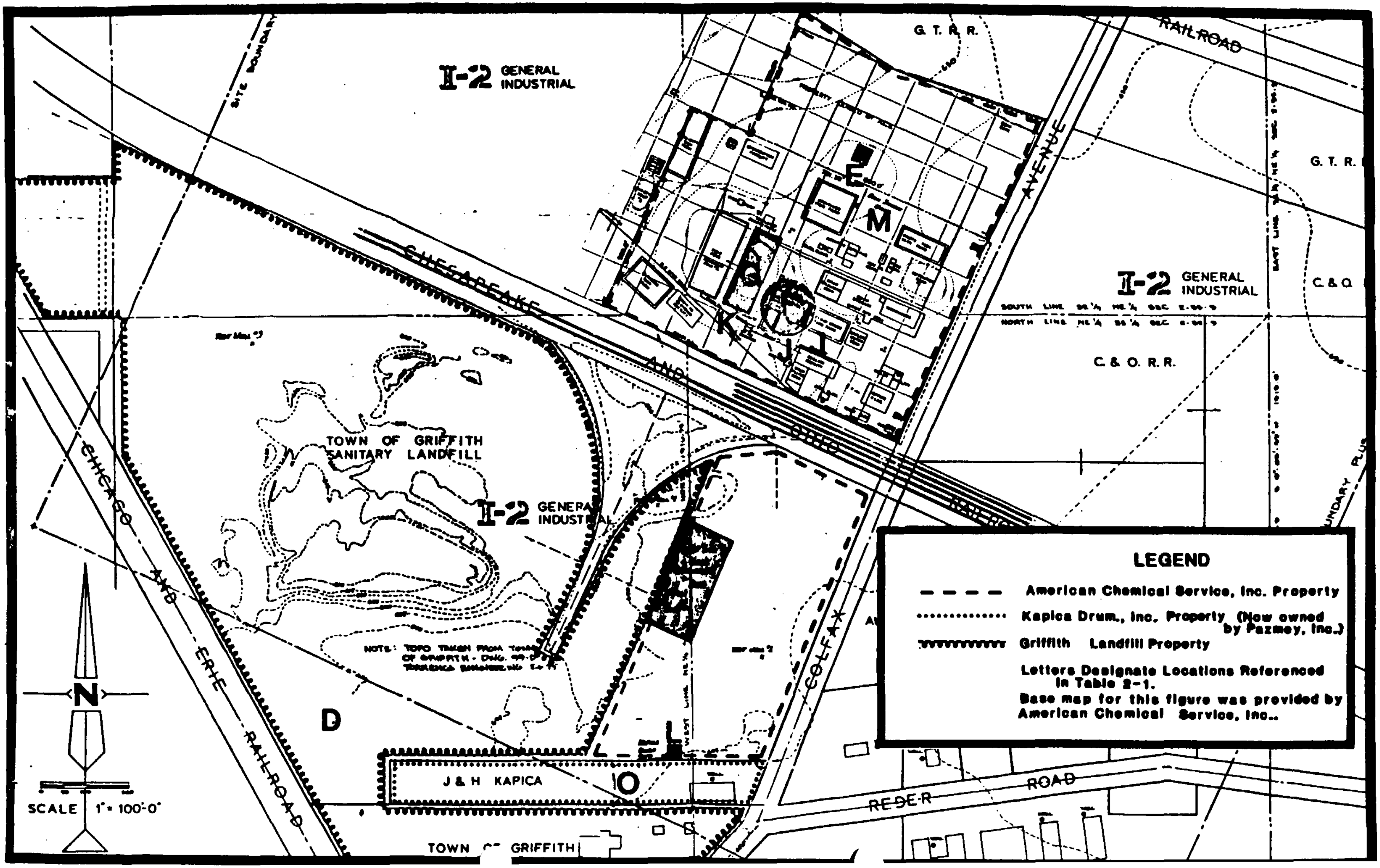


FIGURE 2-1 REMEDIAL INVESTIGATION SITES
American Chemical Service, Inc. Work Plan



G. T. R. R.
RAILROAD
I-2 GENERAL INDUSTRIAL
SITE BOUNDARY
G. T. R.
C. & O.
SOUTH LINE
NORTH LINE
C. & O. R.R.
CHESAPEAKE AND OHIO
AVENUE
E
M
A
K
J
TOWN OF GRIFFITH SANITARY LANDFILL
CHICAGO AND ERIE RAILROAD
COLFAX
D
J & H KAPICA
O
L
REDER ROAD
TOWN OF GRIFFITH
N
SCALE 1" = 100'-0"
LEGEND
American Chemical Service, Inc. Property
Kapica Drum., Inc. Property (Now owned by Pazmey, Inc.)
Griffith Landfill Property
Letters Designate Locations Referenced in Table 2-1.
Base map for this figure was provided by American Chemical Service, Inc..

TABLE 2-1

AMERICAN CHEMICAL SERVICE, INC., SITE
Disposal Locations and Waste Types

Location	Classification	Waste Types
American Chemical Service Inc. Property Off-Site Containment Area (Figure 2-1/Location C)	Documented Waste Disposal Location	600 drums of PCB contaminated waste 10,000 cubic yards of distillation bottoms (drummed) Drums containing solidified materials 68 cubic yards of incinerator ash Chlorinated solvents Acetone MEK still bottoms Cresylic acid, cyanide and chromium from plating operation Lead pigments Several hundred cases of empty bottles that had contained 2,4,D and 2,4,5-TP Tank truck containing 500 gallons of solidified paint 200 drums containing solvent solids of benzene, amylacetate, dimethyl aniline, diethylether.
On-site containment area (Figure 2-1/Location E)	Documented Waste Disposal Location	400 drums of sludge and semi-solids of unknown type

TABLE 2-1
(CONT')

Location	Classification	Waste Types
Old still bottoms pond (Figure 2-1/Location F)	Documented Waste Disposal Location	253,510 gallons and 2,000 drums of still bottom sludge, containing 1,1,1-trichloroethane, trichloroethylene, methylene chloride, ~~tolune~~, benzene and other low boiling point solvents. toluene
Treatment Pond Number 1 (Figure 2-1/Location G)	Documented Waste Disposal	200 drums containing solvent solids of benzene, amylacetate, dimethyl aniline, diethylether 41,612 gallons and 1,000 drums containing semi-solid paint, lacquer and ink waste
Kapica Drum, Inc. drum draining area (Figure 2-1/Location L)	Suspected Soil Contamination Location	Drum residue and drum rinse water from drum recycling operation
Old drum storage area (Figure 2-1/Location M)	Suspected Soil Contamination Location	Suspected soil contamination from unknown waste type
Old wastewater trenches (Figure 2-1/Locations, I, J, K)	Suspected Soil Contamination Location	Suspected soil contamination from wastes containing 1,1,1-trichloroethane, trichloroethylene, methylene chloride, toluene, benzene and other low boiling point solvents

TABLE 2-1
(CONT')

Location	Classification	Waste Type/Quantity
Kapica Drum, Inc. Property (Figure 2-1/Location O)	Suspected Soil Contamination Location	Suspected soil contamination from drum residue and drum rinse water from drum recycling operation
Griffith Landfill Property (Figure 2-1/Location D)	Suspected Waste Disposal Location	10 gal/week for 12 years of retained samples containing hazardous substances 2,500 drums of residues from drum recycling operation

contained organic compounds including benzene, toluene, vinyl chloride pentachlorophenol ether and chloroethane. Based on this limited information, it appears that site contamination is confirmed near the ACS Off-Site Containment Area. Other areas at the site are also suspected of contaminating the groundwater and soil; however, this will not be confirmed until the results of the remedial investigation are available.

2.3 CONTAMINANT MIGRATION AND ENVIRONMENTAL/HEALTH EFFECTS

2.3.1 Migration Pathways

Contaminant migration from the ACS site would most likely be by surface water or groundwater pathways. Airborne contaminant migration is not considered likely from the ACS site. As noted in Section 2.2.3, there is limited documentation concerning contamination of the on-site surface and groundwater. Off-site surface water sampling has not been conducted.

Off-site groundwater sampling has been conducted on two occasions. The first study was a Lake County Groundwater Survey conducted by the Indiana State Board of Health in 1981. This was a general county survey and was not conducted in response to the ACS site. The purpose of the survey was to measure total metal content and no organic compound data was collected. Data from seven wells were collected in the vicinity of the ACS site. Well locations ranged from one-half to one-mile southwest of the site. The results of the survey did not reveal any contamination greater than maximum levels set by the SWDA. Since groundwater flow is thought to be in the northeasterly direction, these wells are upgradient from the site and would not be expected to reflect any contamination contributed from the ACS site.

The second groundwater sampling program undertaken by the Lake County Health Department consisted of sampling well water from seven homes near the ACS site. Only one of the seven wells showed any signs of contamination. This well (O'Neil residence) contained benzene and acetone concentrations of 6.2 and 900 ppb, respectively. Because of the absence of contamination in the other six residential wells, the concentration of benzene and acetone in the O'Neil well merits resampling for confirmation. It must be noted that screen depths of these seven wells were never determined. Conceivably, the O'Neil well is screened in a different aquifer (perhaps the upper aquifer) than the other wells and could therefore explain the differences in findings.

2.3.2 Potential Receptors

Groundwater users are the primary receptor of concern. Surface water users and ecosystems are a secondary receptor. Existing information indicates that there are two aquifers beneath the site that are separated by a clay layer. It has been suggested in the literature that the clay layer is impermeable and continuous; however, this has not been confirmed. Existing information indicates that the majority of the private water wells in the vicinity of the site use the lower (Valparaiso) aquifer as their water source. If the clay layer is continuous, then any contamination would probably be limited to the upper aquifer in which case a smaller number of private wells would be in danger of contamination. Obviously, if the clay layer is not continuous or is highly permeable, then both the aquifers and corresponding groundwater users are at risk. In order to investigate the contamination of these groundwater receptors, monitoring wells will be installed during the remedial investigation. In addition, a survey of residential well water quality will be conducted during the remedial investigation.

Surface water in the vicinity of the site is limited to the marsh west of ACS property and a creek that flows through the marsh. This creek flows to Turkey Creek which is approximately one mile south ~~of the ACS~~ property. Contamination of these surface waters would be from runoff from the ACS site or surface leachate from waste disposal sites. Existing records do not indicate any leachate runoff during the past three years. At the present time, there is no surface water quality data available.

2.3.3 Environmental and Public Health Effects

Based on the available information, there appears to be a higher potential for public health effects than for environmental effects. This is based on the fact that there have been no visible environmental impacts noted since the clay wall was installed around the north end of the ACS Off-site Containment Area during the early 1980's. Adverse environmental effects or surface leachate were not observed during the initial site visit.

The potential for environmental and public health effects due to surface water contamination is unknown. To date there are no data available concerning surface water contamination.

Based upon available information and data, there is a significant potential for impacting public health via contamination of local groundwater. The most significant evidence that ACS may threaten local water supply wells was the documentation of organic contaminants in Monitoring Well #2 located southeast of the Off-Site Containment Area. The magnitude of this potential threat to area water supply wells is unknown at this time. Several factors, that will be examined in the the initial site
visit, Initial Remedial Measures are not considered warranted at this time. In the early 1980's a clay containment wall was built around the north end of the ACS Off-site Containment Area where leachate had been observed. During the initial site visit, there was evidence of heavy ground vegetation from

As part of the remedial investigation an endangerment risk assessment will be conducted to more accurately define the potential for environmental and public health effects.

2.4 INITIAL REMEDIAL MEASURES

Based on the review of available information and the initial site visit, Initial Remedial Measures are not considered warranted at this time. In the early 1980's a clay containment wall was built around the north end of the ACS Off-site Containment Area where leachate had been observed. During the initial site visit, there was evidence of heavy ground vegetation from the previous growing season at th eOff-Site Containment Area. No leachate or any other alarming conditions meriting immediate or fast track measures were obsered at teh Off-SiteContainment Area or at any of the other known disposal sites during the site visit.

One item of concern is the detection of benzene and acetone in the drinking water of a homeowner (O'Neil) near the ACS site. Samples of six other nearby wells were found to be free of contaminants. As part of the remedial investigation, one of the first tasks will be to conduct a detailed groundwater use survey of the area around the site. However, it is recommended that the O'Neil well water be sampled now, as opposed to waiting for the sampling that will be conducted during the groundwater use survey to provide verification of the previous results. If contamination is found again, an alternate water supply should be provided immediately.

During December 1984, the Region V Technical Assistance Team (TAT) conducted a site assessment of the American Chemical Services, Inc. site. Their findings concur that Initial Remedial Measures are not necessary at this time. In the TAT report, it was also recommended that the O'Neil well be sampled and analyzed again.

SECTION 3

PRELIMINARY ASSESSMENT OF REMEDIAL ALTERNATIVES

The purpose of this section of the Work Plan is to identify, in a very preliminary way, potential remedial approaches that are consistent with the available site information. This initial identification of potential alternatives was utilized during formulation of the Project Sampling and Analysis Plan in order to ensure the data required to ultimately evaluate candidate remedial strategies would be collected. The criteria that will be used to screen and evaluate remedial alternatives are also described. It must be noted that these alternatives have been identified on a preliminary basis based on information currently existing for the site.

3.1 IDENTIFICATION OF REMEDIAL ALTERNATIVES

Information compiled during the preparation of the Initial Site Evaluation Report indicates that the on-site soils, surface waters, and groundwater are potentially contaminated from past American Chemical Service, Inc., (ACS) and Kapica Drum, Inc., disposal activities and drum reconditioning (i.e., cleaning). Based on the preliminary site characterization data collected to date, possible remedial alternatives listed below have been identified for review and evaluation. It must be noted that because of the paucity of information on the extent and type of buried materials that additional remedial alternatives will be developed during the RI phase.

Remedial Alternative 1.	Off-site treatment or disposal of drum material and contaminated soils and sediments
Alternative Component Technologies	-Evaluate available hazardous waste disposal facilities proximal to the site.
Remedial Alternative 2.	On-site containment
Alternative Component Technologies	-Native soil cover -Multilayer cap system -Synthetic cap system (e.g., liner) -Slurry Wall -Grout Curtain -Sheet Piling

Remedial Alternative 3.	On-site disposal of contaminated soil and drum material
Alternative Component Technologies	-On-site encapsulation in a specially engineered cell
Remedial Alternative 4.	Groundwater treatment
Alternative Component Technologies	-Steam or air stripping -Activated carbon treatment -UV/ozonation
Remedial Alternative 5.	No action.
Alternative Component Technologies	-Periodic monitoring

A combination of the above can be identified as additional alternatives, such as:

Remedial Alternative 8.	Off site treatment/disposal of contaminated soils/sediments and subsurface environmental isolation
Remedial Alternative 9.	Off site treatment/disposal of contaminated soils/sediments, subsurface environmental isolation and treatment of groundwater
Remdial Alternative 10.	Isolation/treatment on-site contaminated soil disposal and subsurface environmental isolation
Remedial Alternative 11.	Contaminated soil isolation/ treatment/on-site disposal, subsurface environmental isolation and treatment of groundwater

3.2 PERFORMANCE CRITERIA AND STANDARDS FOR REMEDIAL ALTERNATIVES

The following criteria will be used as the basis for evaluating alternative remedial action plans. These criteria will provide a consistent basis for comparison, evaluation, and screening of each alternative, and when used in conjunction with the objectives of the overall work assignment, will prove to be effective criteria for selecting a feasible, implementable, and cost-effective remedial action alternative. These criteria include:

1 Environmental effectiveness based on protecting environmental media including groundwater quality and reducing long-term hazards. Secondary environmental effects of implementation of selected technologies will be considered.

2 Institutional factors such as permit requirements, regulatory agency acceptance, and government infrastructure requirements.

3 Environmental and public health factors such as meeting existing or future groundwater quality standards, surface water quality standards, and air emission standards.

4 Cost considerations based on estimated cost versus meeting environmental objectives.

Performance criteria will be based on existing standards where available, (such as Safe Drinking Water Criteria; State Water Quality Standards) or on RCRA regulations which suggest cleanup to background levels. In cases where existing standards are not available or appear economically or techologically impractical, appropriate state and federal agencies (e.g., Dept. of Health and Human Services may be consulted in development of performance criteria).

3.3 APPROACH TO ALTERNATIVE EVALUATION

The factors selected for evaluation and screening of the alternatives have been identified on the basis of performance criteria and available standards. For each performance criteria and standard, a variety of factors will be used for comparison of the remedial alternatives during the screening and evaluation processes. Specific evaluation factors are listed and summarized below:

1. Environmental Effectiveness
   The technical feasibility will be evaluated based on the following factors:

   o Proven technology - Has the technology been successfully applied in a similar remedial action project?

   o Reliability - Is the technology dependable; can equipment be expected to operate with a minimum of downtime?

   o Operability - Is the technology simple to operate; can it be practically operated under the site field conditions?

- o <u>Flexibility</u> - Will the technology operate efficiently under variable conditions (i.e., safety constraints required by nature of the contaminated soils or varying hydraulic loadings for a groundwater treatment system)?

- o <u>Equipment availability</u> - Is the equipment commercially and readily available for field application or can a long delivery time be expected?

- o <u>Susceptibility to toxic contaminants</u> - Is the technology subject to upset due to the presence of toxic constituents (i.e., soil and groundwater treatment processes)?

- o <u>Implementability</u> - Alternatives considered must be implementable in a relatively short time to minimize costs.

2. Institutional Factors

The institutional factors that will be considered in the evaluation of remedial action alternatives include:

- o Acceptability by Federal and State regulatory agencies.

- o Safety (i.e., on-site and off-site requirements during implementation of the alternatives).

- o Public acceptance.

- o Permits and licenses (i.e., air or water discharge permits; construction or operations permits).

- o Long-term land use.

- o Long-term management agency requirements.

3. Environmental and Public Health Factors

The purpose of remedial action at the site is to rectify any existing and potential future environmental effects and mitigate conditions that could potentially affect public health in the area. Therefore, the ability of a remedial alternative to mitigate/eliminate these impacts is important. Remedial alternatives will be evaluated considering their ability to:

- o Prevent human access or possible contact with the contaminated materials after site work is completed.

- o Abate/minimize existing and potential future groundwater migration and contamination.
- o Minimize any potential additional impacts during remedial action operations on air, land, surface water, and groundwater.
- o Minimize any potential adverse impacts on human health, wildlife and vegetation, neighboring properties, and other sensitive populations.
- o Abate/minimize existing and potential future migration and contamination of air, soils, and surface waters.

4. Cost Effectiveness

A remedial cleanup program must not only be technically feasible for meeting the environmental objectives of the remedial action, but must also be amenable to being implemented in a cost-effective manner. In evaluating the cost-effectiveness of various remedial alternatives, costs for each alternative will be identified by taking into consideration capital and investment costs, labor/expenses, operating costs, and any long-term maintenance costs. A present worth method, approved by EPA, will be utilized for cost comparison purposes. The cost of alternatives will be compared to the alternative which meets all pertinent regulations.

3.4 IDENTIFICATION OF DATA REQUIREMENTS

The review of available data has provided the following information concerning the American Chemical Services, Inc. site which includes the Griffith Landfill and Kapica Drum, Inc. (now Pazmey Corp.) property.

1. General information concerning geology and hydrogeology of the area from published studies and reports. Some site specific soils information is available from on-site soil borings and off-site well logs.

2. Specific information as to the types and quantities of wastes disposed of by ACS.

3. Non-specific information as to the types and quantities of waste disposed of by Kapica Drum, Inc. Basically all that is known is that Kapica Drum, Inc. reconditioned drums containing hazardous and non-hazardous residues from ACS and other clients. It has been reported the drum residue and rinse water was disposed of on Kapica Drum property and ACS property. In addition, this information is second-hand since it was supplied by ACS, not Kapica Drum, Inc.

4. Specific information as to the types of waste disposed of by ACS at the Griffith Landfill.

5. Non-specific information concerning the types of waste disposed of by Kapica Drum, Inc. at the Griffith Landfill. Again, this is second-hand information supplied by ACS.

6. Specific information concerning the location of known waste disposal on ACS property and areas of suspected soil contamination.

7. Non-specific information concerning the location of waste disposal on Griffith Landfill property.

8. Specific but limited data concerning on-site migration of hazardous wastes on ACS property. No data is available concerning hazardous waste migration from suspected disposal locations on Kapica Drum, Inc. or Griffith Landfill property.

9. Very limited data concerning waste migration outside of ACS, Kapica Drum, Inc. and Griffith Landfill property. In particular, there is very little data concerning groundwater contamination.

10. Detailed information concerning property ownership was available; however, there is a question as to whether or not part of the ACS Off-Site Containment Area is on Griffith Landfill property.

The information needed to fill the available gaps in the data are as follows:

1. The following information is needed concerning on-site geology:

   a. Stratigraphy at the site determined by boreholes extending to bedrock.

   b. Characterization of geotechnical, hydrological, and geological parameters of the soils and sediments on site.

   c. Confirmation of the given geological data including well logs and hydrogeologic data such as hydraulic conductivities and transmissivities.

   d. Better definition of the water table configuration.

   e. Better definition of the permeability, extent and continuity of the clay layer.

2. Specific information concerning the types and quantities of hazardous wastes disposed of by Kapica Drum, Inc. and accepted for disposal by the Griffith Landfill. In general, more information concerning the disposal of hazardous materials by Kapica Drum, Inc. and Griffith Landfill is needed. A request for information similar to that sent to ACS by the U.S. EPA would provide useful information.

3. More detailed characterization of the waste as it exists now on the ACS property. All of the waste on ACS property has been buried 8 to 10 years. A more detailed source characterization of all waste disposed at the site is needed. The details of the characterization is contained in the Sampling and Analysis Plan.

4. More detailed evaluation of the extent of migration of contaminants from the site. This includes the ACS, Kapica Drum, Inc. and Griffith Landfill property.

5. More detailed information concerning potential impact to receptors. Specifically, a survey of public water supplies should be conducted to determine those residents that use groundwater, including determining which aquifer is used. Selected wells will be sampled and analyzed for hazardous waste constituents.

3.5 REMEDIAL INVESTIGATION/FEASIBILITY STUDY OBJECTIVES

The ultimate objectives of the RI/FS are:

- Quantify the type and extent of contamination on-site and off-site.
    - Identify relationship between current contamination and origin/source.
    - Establish the potential for future off-site contaminant migration.
    - Identify/develop standards and criteria for contaminant cleanup.
    - Determine the magnitude and probability of actual or potential harm to public health, welfare, or the environment.
- Remedial Action Assessments
    - Identify technological options for cleaning up and preventing migration of contaminants beyond installation boundaries.
    - Evaluate remediation alternatives consistent with the National Contingency Plan and other regulatory requirements and guidelines.
    - Recommend the remedial action that is technically and environmentally sound, and the most cost effective.
- Supply basis for preparing the Record-of-Decision.

SECTION 4

REMEDIAL INVESTIGATION SCOPE OF WORK

This section of the Work Plan describes the site investigation activities that will be conducted during execution of the project. Various project plans that address specific issues of project execution, that require more detailed treatment than the scope of a typical work plan would include, have also been prepared as supporting documents to the Work Plan. The following three plans, having individual scopes as described below, have been or are being prepared.

- Health and Safety Plan - including a Site Evaluation Form (SEF) which covers personal protective equipment needed depending on location and activity within the site, contingency plans and emergency procedures, field monitoring equipment, and decontamination procedures. Also included in the Health and Safety Plan is a section concerning site management. This section addresses operations at the site including site access and security, site office and decontamination facilities, equipment and materials needs and storage, communications and support functions, and coordination of sampling activities.

- Quality Assurance Project Plan - covers QA data measurement objectives, sampling objectives and procedures, sample custody, calibration procedures, interval QC checks, QA performance audits, QA reports, preventive maintenance, data assessment procedures, corrective action, and field protocols.

- Sampling and Analysis Plan - covers data collection objectives, sample locations, sample numbering, sampling equipment and procedures, sample analysis and handling, sample documentation and tracking, sampling team organization, and sampling schedule. The Sampling and

Analysis Plan is an appendix to the Quality Assurance Project Plan. This is a document to be used in the field, as well as in project planning.

Drafts of all the aforementioned Operations Plans have been prepared and submitted for REM II review. Following REM II review, the plans will be submitted to the EPA for review and comment.

4.1 RI TASK 1 - SUBCONTRACTING AND MOBILIZATION

Prior to initiating the remedial investigation field work it will be necessary to procure subcontractor services; establish field support facilities; and identify, obtain and mobilize equipment and materials. Specific work items associated with each of the aforementioned categories as listed below:

4.1.1 Procure Subcontractor Services:

Subcontractors must be secured for the following field activities:

1. Construction subcontractor to construct Items 1, 3, 4 and 7 listed under Field Support Facilities.

2. Surveying subcontractor to conduct the site boundary survey and site grid and elevation survey.

3. Excavation subcontractor to conduct the sampling pit excavation.

4. Drilling subcontractor to conduct the installation of monitoring wells and groundwater wells.

4.1.2 Field Support Facilities

1. Grade and level site as required to locate field support facilities.

2. Rent and set up project office trailer.

3. Construct fenced secure storage area.

4. Construct an equipment (drill rigs, backhoe, etc.,) wash down and decontamination pad and lined contaminated wash water storage tank.

5. Set-up sampling equipment decontamination area.

6. Set-up personnel decontamination area.

7. Construct a small equipment (coolers, shovels, etc.,) storage shed.

8. Make necessary arrangements for telephone and electrical hook-up at the site project trailor.

9. Arrange for on site water and sewage facilities.

4.1.3 Mobilize Equipment and Materials:

Mobilization of equipment and materials involve the following items:

1. Schedule and obtain non-expendable health and safety equipment (HNu, OVA, 0_2 meter etc.,)

2. Schedule and obtain expendable health and safety equipment (Gloves, booties, tyvek coveralls, etc., decontamination equipment and supplies.)

3. Schedule and obtain all necessary sampling equipment.

4. Schedule and obtain all necessary sampling bottles, preservatives, coolers, etc,.

5. Obtain all miscellaneous items needed on site. (Paper, pens, telephone books, etc,.)

4.2 RI TASK 2 - STUDY AREA SURVEYS

4.2.1 Site Boundary Survey

A site boundary survey will be made in order to accurately define the study boundaries and delineate the ACS, City of Griffith Landfill, and Kapica Drum, Inc. (now Pazmey Corporation) property boundaries. The survey data will be utilized to prepare site maps, locate sampling points and monitoring well locations, and assist in determining which parties must be contacted to obtain property access permission for on-site investigation activities. The survey work will also be used to determine if the Griffith Landfill property boundary overlaps the ACS off-site drum containment area. In addition, the boundary survey will identify those parties who own property that has had hazardous materials stored and/or disposed on it.

4.2.2 Grid and Elevation Survey

A grid system will be established on the ACS site to allow accurate siting of sampling points, and allow mapping of historic waste disposal site and contaminated areas. The grid will be based upon two perpendicular baselines with a maximum grid interval of 100 ft. Site (ground) elevation data will be collected at selected grid points to establish elevations of sampling locations. The elevation data could also eventually be used to establish initial ground control elevations during initial site remediation activities and to estimate soil quantities for cut/fill calculations. The grid system will also provide ground control for geophysical surveys (Section 4.2.4)

4.2.3 Groundwater Utilization Survey

A survey of residential, municipal and industrial wells within a one-mile radius of the ACS site will be conducted. The objectives of the survey include:

- o Identify water sources in the area (lake, river, groundwater, etc.,)
- o Identify the number, type and location of wells in the vicinity of the ACS site.
- o Determine if the wells pump from the upper or lower aquifer below the ACS site.
- o Determine which wells should be sampled as part of the remedial investigation work.

4.2.4 Geophysical Surveys

A geophysical survey will be conducted in order to more accurately define the extent of drum disposal areas (i.e., potentially contaminated areas). The survey will involve the use of a magnetometer to locate drums in the ACS Off-Site Containment Area, On-site Containment Area, Old Still Bottoms Pond and, Treatment Pond #1. The data collected will also be utilized to finalize soil boring and monitoring well locations.

4.2.5 Technical Memoranda

Technical memoranda will be prepared to document field survey activities undertaken with RI Task 2. This initial memorandum will also provide detailed results of each survey including: 1) property boundaries map; 2) a grid and surface elevation map; 3) results of the local groundwater utilization survey; and 4) results of the geophysical surveys.

4.3 RI TASK 3 - SOURCE CHARACTERIZATION

There are insufficient data regarding the volume, concentration, and character of waste disposed at the American Chemical Service (ACS) site. ACS has provided some information on the approximate location and general nature of waste disposal on-site, but additional data are needed. Therefore, an investigation of the known disposal sites (the Still Bottoms Pond, Treatment Pond 1, the On-Site Drum Containment Area, the Off-Site Drum Containment Area, and the Kapica Dump Site) must to be completed. This will involve sampling of the waste and the natural soil materials underlying the waste. There is also evidence that waste material has been spilled or dumped on the ground in the Drum Storage Area and possibly within the old Kapica Drum (now Pazmey Drum) property. Investigation of these areas will involve sampling of surficial soils for characterization of residual contamination.

The objectives of the sampling program to be implemented as part of the RI/FS at the American Chemical Services site in Griffith, Indiana, are as follows:

- To determine and characterize the location, nature, and volume of the contaminated areas on site including the old Still Bottoms Pond, Treatment Pond 1, Kapica Dump Site, the On-Site Drum Containment Area, and the Off-Site Drum Containment Area.

The scope of sampling activities to be conducted as part of the source characterization task includes the drilling of 14 soil and waste borings, trenching of 6 waste pits and collection and analysis of 122 samples. Chemical analysis to detect priority pollutants and other hazardous materials will be performed on 100 investigative samples, in addition to 11 duplicates, and 11 blanks. The sampling effort is summarized in Table 4-1, and the sampling and analysis program is presented in detail in Table 4-2.

4.3.1 Waste and Natural Soil Samples from Test-Pits

Three source areas are known to contain considerable numbers of buried drums -- the On-Site Drum Containment Area, the Still Bottoms Pond, and Treatment Pond 1. In two of these areas, the drums were dumped, crushed and compacted and it is expected that fill materials will consist of a mixture of waste residue and drum carcasses. Test-pits will be used to profile the materials in these areas and to allow collection of waste samples and soil samples from below the waste. One pit will be sufficient in the On-Site Drum Containment Area, two pits are needed in the Still Bottoms Pond (parts of which now have process structures built on top), and three will be needed in the Treatment Pond No. 1 area. In each test pit, three waste samples and one natural subsoil sample will be collected. This sampling in conjunction with geophysical studies will provide data for evaluating the volume, concentration, and character of the wastes in these source areas. Data will also provide the basis for assessing the extent to which the wastes are moving into adjacent soil materials. The approximate locations of the test pits are shown in Figure 4-1.

4.3.2 Waste and Natural Soil Samples from Borings

Test borings will be used to collect waste and natural soil samples in two of the source areas -- the Off-Site Drum Containment Area, and the Kapica Dump Site. Although there is evidence of a substantial number of drums buried in the Off-Site Drum Containment Area, borings are proposed (rather than test pits) because there is a clay cap over the area and it seems likely that the drums are not densely packed. It is anticipated that the drums disposed of in this area were crushed and the fill materials will consist of a mixture of waste residues and drum carcasses. Thus, there should be less damage to the integrity of the cap with a good probability of success fully defining the extent of contamination. Five borings will be drilled in the Off-Site Drum Containment Area with five waste samples and one natural soil sample collected in each boring. Three borings are planned for Kapica Dump Site, which apparently consists of alternating layers of drum sludges and soil. Three waste samples and one natural subsoil sample will be collected from these borings. This sampling will provide data for evaluating the volume, concentration and character of the wastes in these source areas and for assessing the extent to which the wastes are moving into adjacent soil materials. The approximate locations of the test borings are shown in Figure 4-1.

TABLE 4-1

SOURCE CHARACTERIZATION SAMPLING EFFORT

	Investigative	Duplicate	Blank
Waste Pit (WP)	18	2	2
Natural Soil-Pit (NP)	6	1	1
Waste Boring (WB)	34	3	3
Natural Soil-Boring (NB)	8	1	1
Soil Area (SA)	16	2	2
Soil Boring (SB)	18	2	2
Chemical Subtotal	100	11	11

Total: 122

TABLE 4-2

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples No.	Investigative Samples Freq.	Investigative Samples Total	QA Samples Duplicate No.	Duplicate Freq.	Duplicate Total	Blank No.	Blank Freq.	Blank Total	Matrix Total
Waste Pits (High)	Qualitative organic vapor screening with OVA and HNu	RAS high hazard sample preparation by HSL for following by SAS:	18	1	18	2	1	2	2	1	2	22
		RAS organics parameters including 30 tentatively identified parameters	18	1	18	2	1	2	2	1	2	22
		RAS inorganics parameters/metals	18	1	18	2	1	2	2	1	2	22
		RAS inorganics parameters/cyanide	18	1	18	2	1	2	2	1	2	22
Natural Soils-Waste Pits (Medium)	Qualitative organic vapor screening with OVA and HNu	RAS organics package from CLP including 30 tentatively identified parameters	6	1	6	1	1	1	1	1	1	8
		RAS inorganics package/metals from CLP	6	1	6	1	1	1	1	1	1	8
		RAS inorganics package/cyanide from CLP	6	1	6	1	1	1	1	1	1	8
Waste Borings (High)	Qualitative organic vapor screening with OVA and HNu	RAS high hazard sample preparation by HSL for following by SAS:	34	1	34	3	1	3	3	1	3	40
		RAS organics parameters including 30 tentatively identified parameters	34	1	34	3	1	3	3	1	3	40
		RAS inorganics parameters/metals	34	1	34	3	1	3	3	1	3	40
		RAS inorganics parameters/cyanide	34	1	34	3	1	3	3	1	3	40

Note: Field parameters determined for investigative and duplicate samples only.

TABLE 4-2

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples No.	Investigative Samples Freq.	Investigative Samples Total	QA Samples Duplicate No.	Duplicate Freq.	Duplicate Total	Blank No.	Blank Freq.	Blank Total	Matrix Total
Waste Pits (High)	Qualitative organic vapor screening with OVA and HNu	RAS high hazard sample preparation by HSL for following by SAS:	18	1	18	2	1	2	2	1	2	22
		RAS organics parameters including 30 tentatively identified parameters	18	1	18	2	1	2	2	1	2	22
		RAS inorganics parameters/metals	18	1	18	2	1	2	2	1	2	22
		RAS inorganics parameters/cyanide	18	1	18	2	1	2	2	1	2	22
Natural Soils-Waste Pits (Medium)	Qualitative organic vapor screening with OVA and HNu	RAS organics package from CLP including 30 tentatively identified parameters	6	1	6	1	1	1	1	1	1	8
		RAS inorganics package/metals from CLP	6	1	6	1	1	1	1	1	1	8
		RAS inorganics package/cyanide from CLP	6	1	6	1	1	1	1	1	1	8
Waste Borings (High)	Qualitative organic vapor screening with OVA and HNu	RAS high hazard sample preparation by HSL for following by SAS:	34	1	34	3	1	3	3	1	3	40
		RAS organics parameters including 30 tentatively identified parameters	34	1	34	3	1	3	3	1	3	40
		RAS inorganics parameters/metals	34	1	34	3	1	3	3	1	3	40
		RAS inorganics parameters/cyanide	34	1	34	3	1	3	3	1	3	40

Note: Field parameters determined for investigative and duplicate samples only.

TABLE 4-2 (continued)

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Field Parameters	Laboratory Parameters	Investigative Samples			QA Samples					
					Duplicate			Blank		
		No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total
Qualitative organic vapor screening with OVA and HNu	RAS organics package from CLP including 30 tentatively identified parameters	8	1	8	1	1	1	1	1	1
	RAS inorganics package/metals from CLP	8	1	8	1	1	1	1	1	1
	RAS inorganics package/cyanide from CLP	8	1	8	1	1	1	1	1	1
Qualitative organic vapor screening with OVA and HNu	RAS organics package from CLP including 30 tentatively identified parameters	16	1	16	2	1	2	2	1	2
	RAS inorganics package/metals from CLP	16	1	16	2	1	2	2	1	2
	RAS inorganics packag/cyanide from CLP	16	1	16	2	1	2	2	1	2
Qualitative organic vapor screening with OVA and HNu	RAS organics package from CLP including 30 tentatively identified parameters	18	1	18	2	1	2	2	1	2
	RAS inorganics package/metals from CLP	18	1	18	2	1	2	2	1	2
	RAS inorganics package/cyanide from CLP	18	1	18	2	1	2	2	1	2

rameters determined for investigative and duplicate samples only.

TABLE 4-2 (continued)

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples No.	Investigative Samples Freq.	Investigative Samples Total	QA Samples Duplicate No.	Duplicate Freq.	Duplicate Total	Blank No.	Blank Freq.	Blank Total	Matrix Total
Natural Soils-Waste Borings (Medium)	Qualitative organic vapor screening with OVA and HNu	RAS organics package from CLP including 30 tentatively identified parameters	8	1	8	1	1	1	1	1	1	10
		RAS inorganics package/metals from CLP	8	1	8	1	1	1	1	1	1	10
		RAS inorganics package/cyanide from CLP	8	1	8	1	1	1	1	1	1	10
Soil Areas (Low)	Qualitative organic vapor screening with OVA and HNu	RAS organics package from CLP including 30 tentatively identified parameters	16	1	16	2	1	2	2	1	2	20
		RAS inorganics package/metals from CLP	16	1	16	2	1	2	2	1	2	20
		RAS inorganics packag/cyanide from CLP	16	1	16	2	1	2	2	1	2	20
Soil Borings (Low)	Qualitative organic vapor screening with OVA and HNu	RAS organics package from CLP including 30 tentatively identified parameters	18	1	18	2	1	2	2	1	2	22
		RAS inorganics package/metals from CLP	18	1	18	2	1	2	2	1	2	22
		RAS inorganics package/cyanide from CLP	18	1	18	2	1	2	2	1	2	22

lote: Field parameters determined for investigative and duplicate samples only.

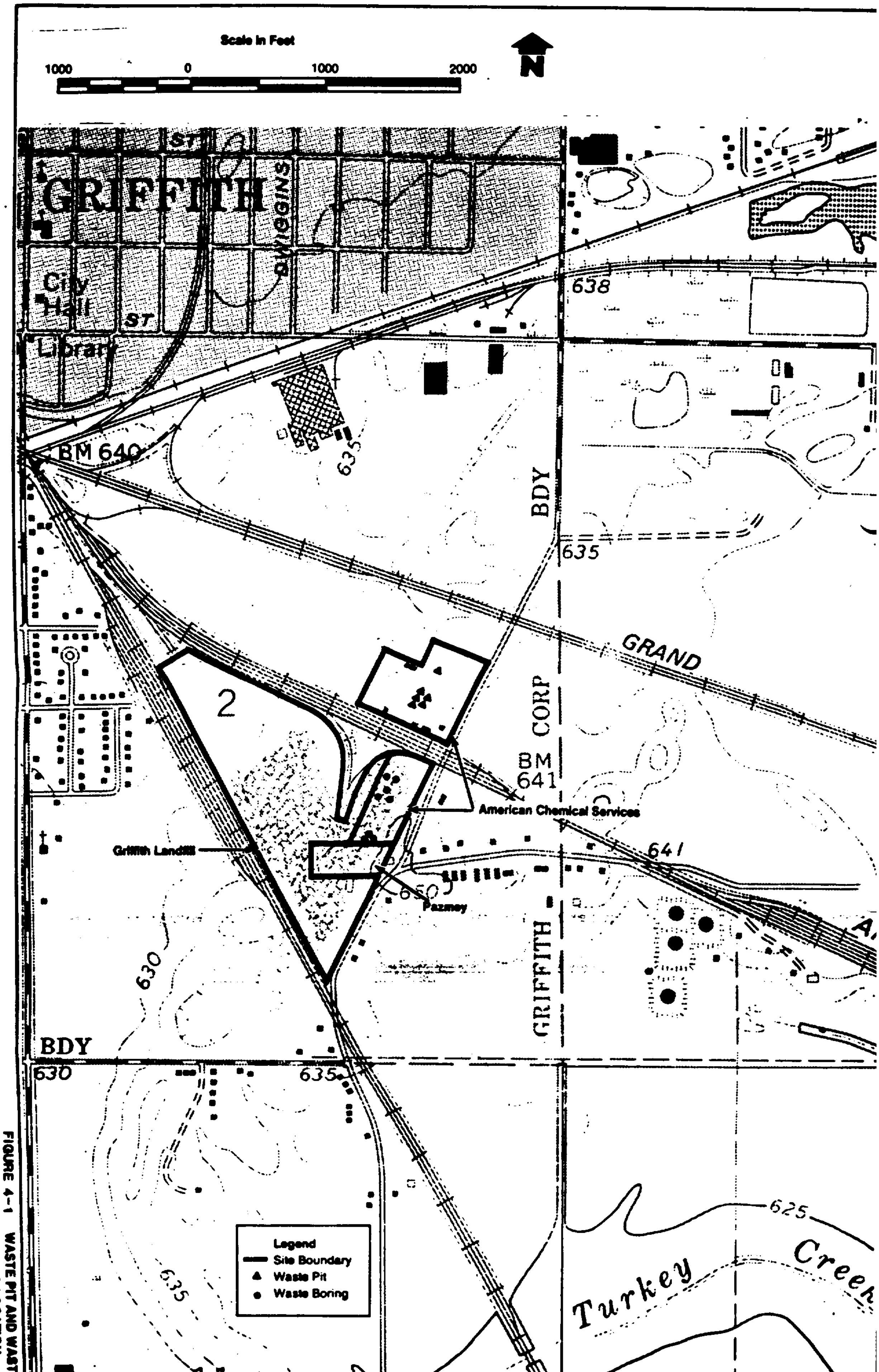


FIGURE 4-1 WASTE PIT AND WASTE BORING LOCATION

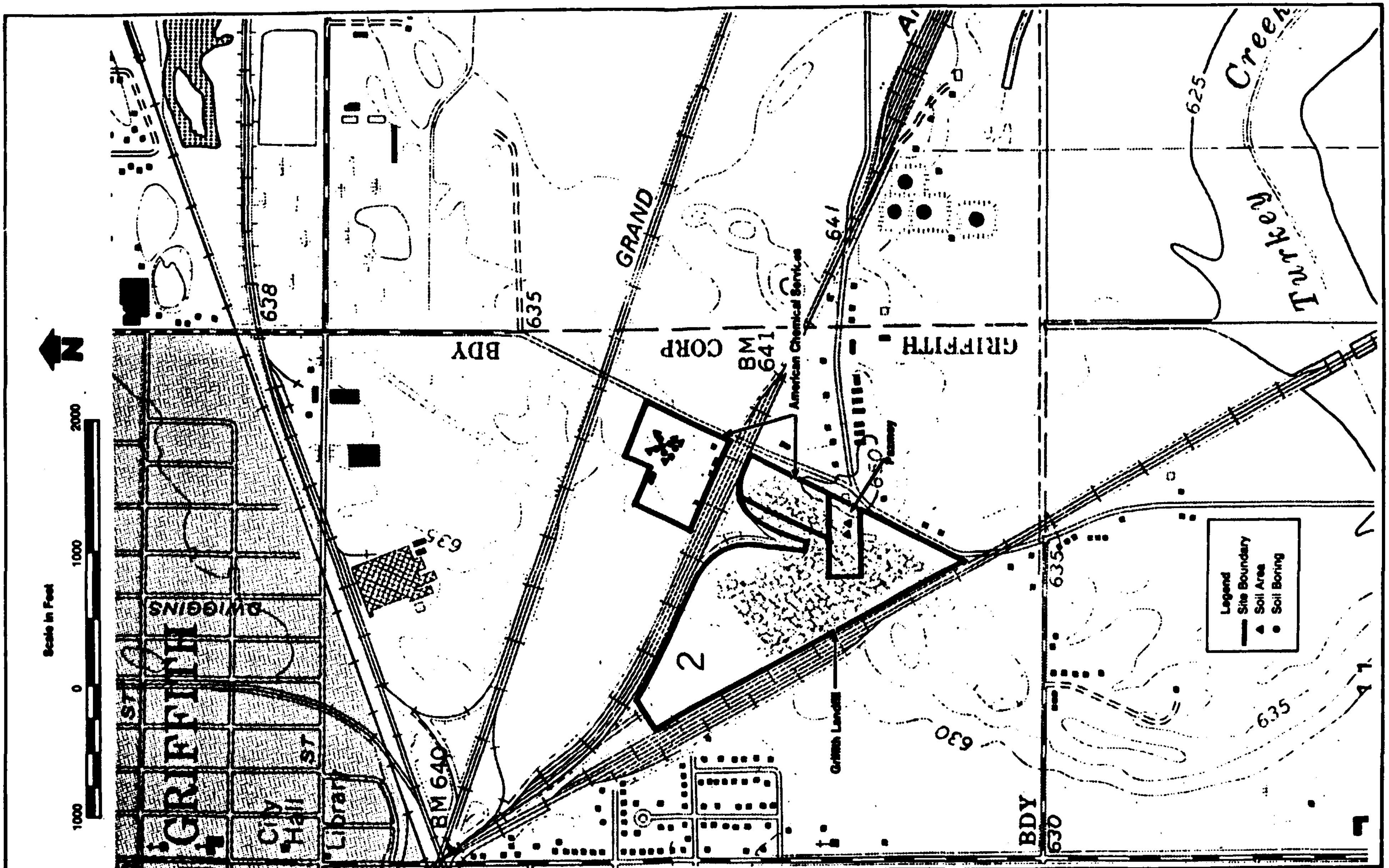


FIGURE 4-2 SOIL AREA AND SOIL BORING LOCATIONS

4.3.5 Technical Memoranda

A technical memorandum will be prepared upon cmpletion of the source characterization field work to document the field activities and present the findings. The technical memorandum specific to source characterization will address, as a minimum, the following subjects:

- Sampling and analysis of waste from pits and borings; identification of source areas and type and extent of contamination.
- Sampling and analysis of soil on-site from composite and grab samples and soil borings; identification of on-site contaminant levels in soil including areal extent and depth, evaluation of contaminant mobility and attenuation.

4.4 RI TASK 4 - SITE CHARACTERIZATION

The most significant migration pathway by which contamination at the ACS site may migrate is via groundwater, particularly the upper aquifer, which begins at the ground surface. In 1982, four shallow (approximately 20 ft.) test wells were installed by the FIT. A groundwater sample collected from one of these wells was found to contain substantial amounts of organic chemicals, including benzene, toluene, and trichloroethylene. Monitoring wells, soil boring samples, water level measurements, permeability tests, and geotechnical testing of soil samples will be used to characterize this migration pathway. Private water supply wells will be sampled as a precaution for protection of the public health and to provide information regarding the presence and extent of contamination in the lower aquifer, which is the main aquifer used for water supply in the area.

It is also possible that contaminants are migrating from the site via surface water, either by direct runoff or as a result of groundwater discharge to surface water bodies. Contamination accumulation in sediments could be occuring as well. These environmental media will be sampled and tested for contaminaiton. The objectives of the sampling program to be implemented within the RI/FS at the American Chemical Services site in Griffith, Indiana, are as follows:

- To determine the details of on-site soil stratigraphy and the stratigraphy in adjacent off-site areas.
- To determine the hydrogeologic conditions in the upper and lower aquifers, including vertical and horizontal groundwater flow conditions on-site and in adjacent off-site areas.

- To determine the configuration of the water table in the upper aquifer and the potentiometric surface in the lower aquifer on site and in adjacent areas off site.

- To identify surficial drainage features and flow patterns, and characterize the relationship of surface water to groundwater on site and in adjacent off-site areas.

- To characterize the areal extent and mobility of groundwater contamination in the upper aquifer and in the water supply aquifer on site and in adjacent off-site areas.

- To characterize the extent of surface water and sediment contamination on site and in adjacent off-site areas.

- To determine if groundwater currently being pumped by private wells within one mile of the site is contaminated with priority pollutants.

The scope of sampling activities to be conducted as part of the site characterization activities includes the installation of 40 groundwater monitoring wells, and collection and analysis of 203 samples. Chemical analysis to detect priority pollutants will be performed on 137 samples, of which 113 are investigative, 12 are duplicates, and 12 are blanks. Geotechnical index properties (grain size distribution, Atterberg limits, hydraulic conductivity) will be determined for 66 samples, including 6 field duplicates, to characterize on-site soil materials. The environmental media to be sampled include groundwater, surface water, sediment, soil and private water wells. The sampling effort is summarized in Table 4-3, and the sampling and analysis program is presented in detail in Table 4-4.

4.4.1 Monitoring Wells and Groundwater Samples

Regional groundwater flow in the vicinity of the ACS site is reportedly to the northeast; however, due to several features near the site, flow patterns on site are not well defined. A small creek is located one-half mile to the south and the only other major surface water body is the Little Calumet River, three miles to the north. Therefore, there may be a local drainage divide through or to the north of the site. Griffith Landfill has also excavated 30 feet of soil material and is pumping to control the inflowing water, which will also affect local groundwater flow.

Based on existing subsurface data, the hydrostratigraphy at the site appears to consist of:

TABLE 4-3

SITE CHARACTERIZATION SAMPLING EFFORT

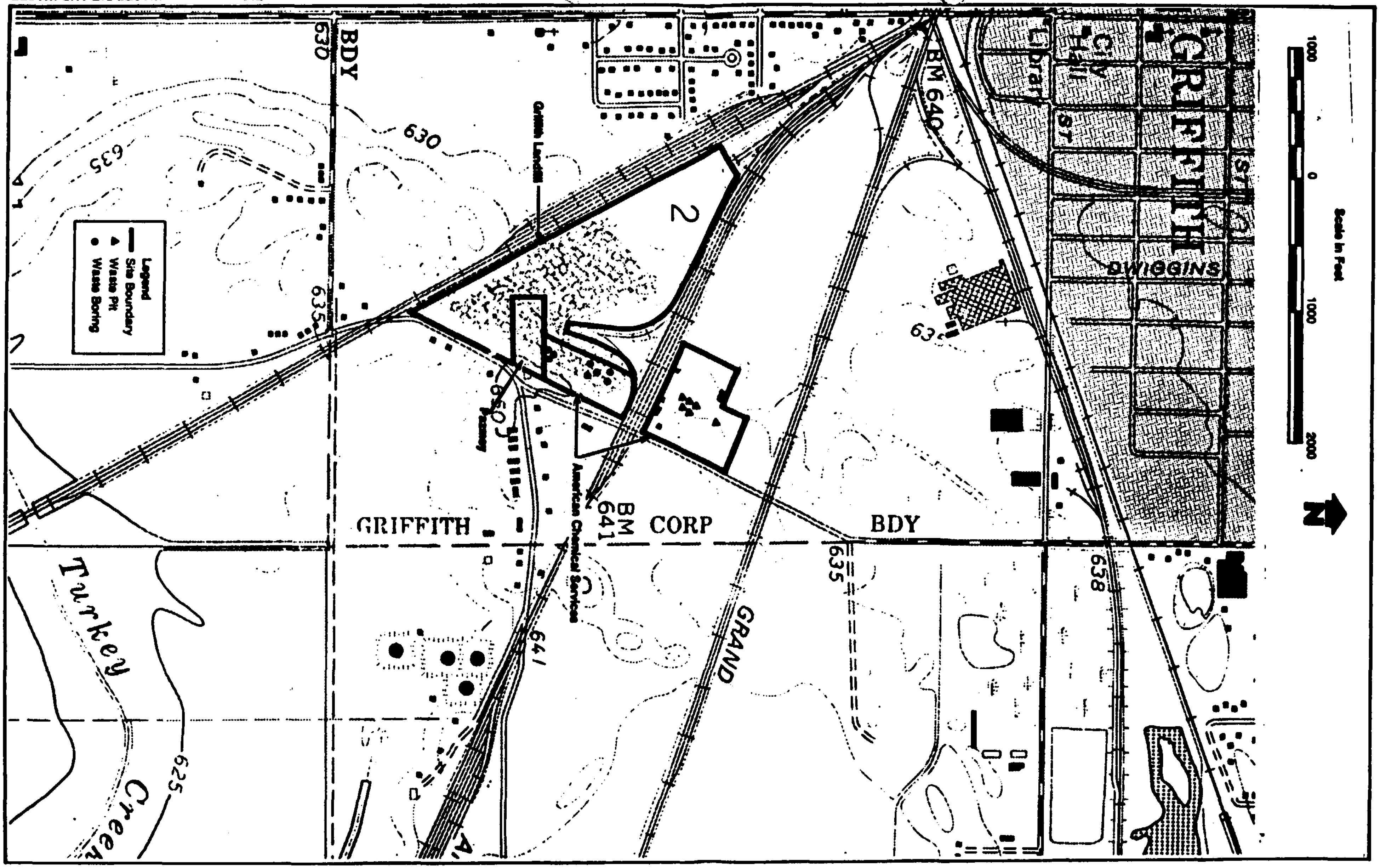
		Investigative	Duplicate	Blank
Groundwater (GW)				
	I filtered	40	4	4
	I unfiltered	7	1	1
	II filtered	20	2	2
	II unfiltered	3	1	1
Surface Water (SW)				
	unfiltered	9	1	1
Sediment (SD)		9	1	1
Private Wells (PW)		25	2	2
Subtotal		113	12	12
Chemical Subtotal		137		
Geotechnical*		60	6	-
Geotechnical Subtotal		66		

Total: 203

---

*Samples for geotechnical testing collected during monitoring well installation.

FIGURE 4-1 WASTE PIT AND WASTE BORING LOCATION



4.3.3 Soil Area Samples

In both the ACS Drum Storage Area and the former Kapica Drum property, there is evidence indicating that minor drips, spills and leaks of various chemical substances did or could have occured. Resulting residual contamination of the unsaturated zone, if there is any remaining at this time, would be dispersed throughout relatively large areas. Composite soil samples will be used to provide a general characterization of any residual contamination in these potential source areas. The Drum Storage Area will be divided into four sampling areas and the former Kapica Drum property will be divided into two sampling areas. Within each sampling area, soil will be collected at five discrete sites at two depth intervals -- 6 to 12 inches and 18 to 24 inches. Each soil sample will be qualitatively screened for organic vapors using HNu or OVA. Samples will be composited by depth within each sampling area. In addition to these composite samples, grab samples will be collected at two specific areas -- near the former fume incinerator and at the site of a spill/fire -- at the same depth intervals. The approximate locations of the sampling areas for the soil area samples are shown in Figure 4-2.

4.3.4 Soil Boring Samples

Specific data regarding the vertical distribution of residual soil contamination in the Drum Storage Area is needed to complement the general data regarding areal extent obtained from the soil area samples. This data will be collected using six vertically sampled soil borings. The borings will be located on the basis of qualitative organic vapor screening performed during soil area sampling so that attenuation profiles can be developed for a range of near-surface contaminant conditions. In each soil boring, samples from depths of 1-1.5 feet, 2-2.5 feet and 4-4.5 feet will be submitted to the laboratory for chemical analysis. The approximate locations of the soil boring samples are shown in Figure 4-2.

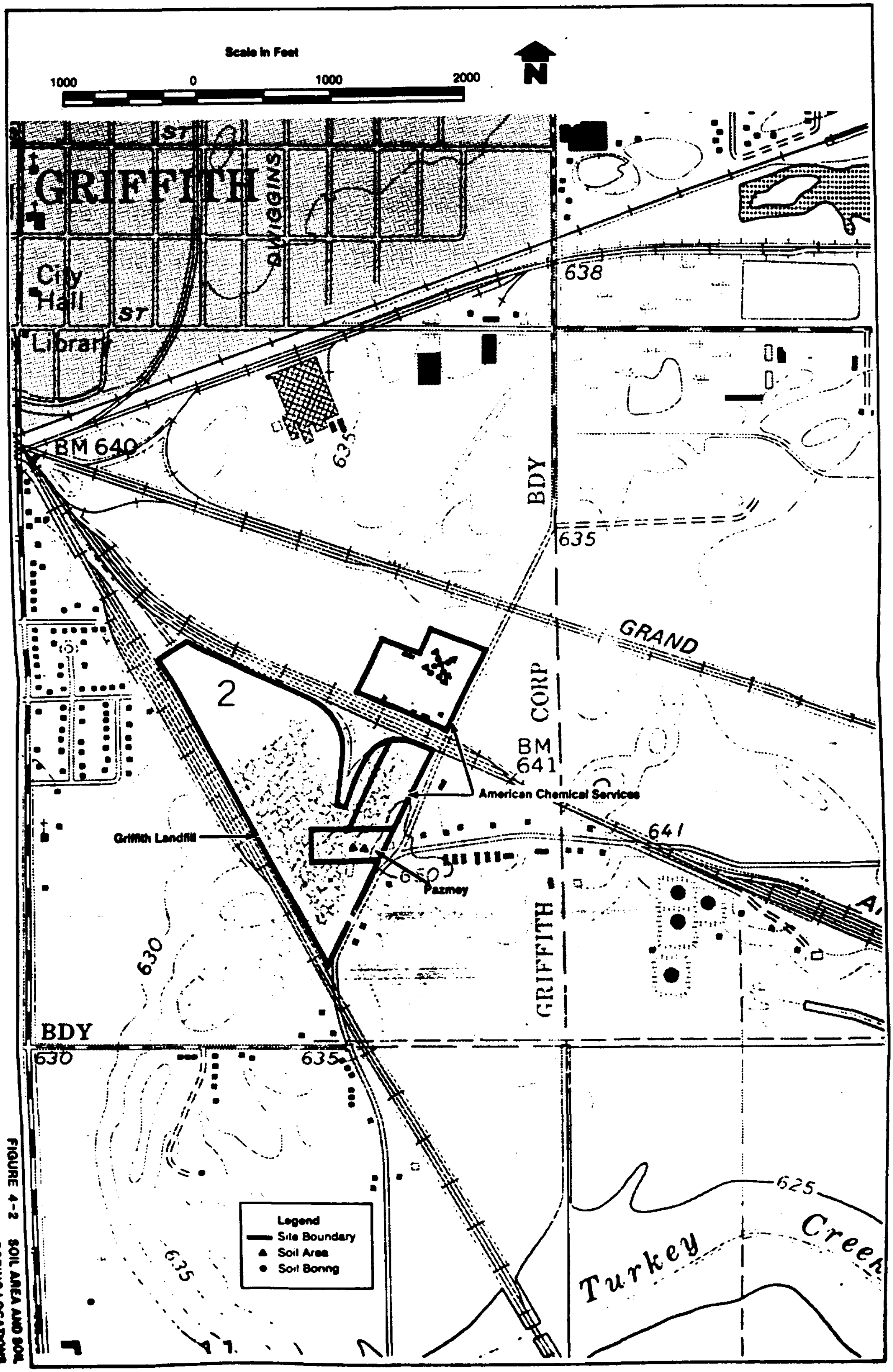


FIGURE 4-2 SOIL AREA AND SOIL BORING LOCATIONS

TABLE 4-4

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples No.	Investigative Samples Freq.	Investigative Samples Total	QA Samples Duplicate No.	QA Samples Duplicate Freq.	QA Samples Duplicate Total	QA Samples Blank No.	QA Samples Blank Freq.	QA Samples Blank Total	Matrix Total
Groundwater (Low)	pH	RAS organics package from CLP including 30 tentatively identified parameters	40	1.5	60	6	1.5	9	6	1.5	9	78
	Specific conductance	RAS inorganics package/metals from CLP filtered samples	40	1.5	60	6	1.5	9	6	1.5	9	78
	Temperature	RAS inorganics package/metals and SAS for suspended solids-unfiltered samples	7	1.5	10	1	1.5	2	1	1.5	2	14
		RAS inorganics package/cyanide from CLP filtered samples	40	1.5	60	6	1.5	9	6	1.5	9	78
Surface Water (Low)	pH	RAS organics package from CLP including 30 tentatively identified parameters	9	1	9	1	1	1	1	1	1	11
	Specific conductance	RAS inorganics package/metals from CLP unfiltered samples	9	1	9	1	1	1	1	1	1	11
	Temperature	RAS inorganics package/metals from CLP unfiltered samples	9	1	9	1	1	1	1	1	1	11
Sediment (Low)	Not applicable	RAS organics package from CLP including 30 tentatively identified parameters	9	1	9	1	1	1	1	1	1	11
		RAS inorganics package/metals from CLP	9	1	9	1	1	1	1	1	1	11
		RAS inorganics package/cyanide from CLP	9	1	9	1	1	1	1	1	1	11

Note: Field parameters determined for investigative and duplicate samples only.

TABLE 4-4

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples No.	Investigative Samples Freq.	Investigative Samples Total	QA Duplicate No.	QA Duplicate Freq.	QA Duplicate Total	QA Blank No.	QA Blank Freq.	QA Blank Total	Matrix Total
Groundwater (Low)	pH	RAS organics package from CLP including 30 tentatively identified parameters	40	1.5	60	6	1.5	9	6	1.5	9	78
	Specific conductance	RAS inorganics package/metals from CLP filtered samples	40	1.5	60	6	1.5	9	6	1.5	9	78
	Temperature	RAS inorganics package/metals and SAS for suspended solids-unfiltered samples	7	1.5	10	1	1.5	2	1	1.5	2	14
		RAS inorganics package/cyanide from CLP filtered samples	40	1.5	60	6	1.5	9	6	1.5	9	78
Surface Water (Low)	pH	RAS organics package from CLP including 30 tentatively identified parameters	9	1	9	1	1	1	1	1	1	11
	Specific conductance	RAS inorganics package/metals from CLP unfiltered samples	9	1	9	1	1	1	1	1	1	11
	Temperature	RAS inorganics package/metals from CLP unfiltered samples	9	1	9	1	1	1	1	1	1	11
Sediment (Low)	Not applicable	RAS organics package from CLP including 30 tentatively identified parameters	9	1	9	1	1	1	1	1	1	11
		RAS inorganics package/metals from CLP	9	1	9	1	1	1	1	1	1	11
		RAS inorganics package/cyanide from CLP	9	1	9	1	1	1	1	1	1	11

Note: Field parameters determined for investigative and duplicate samples only.

TABLE 4-4

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples No.	Investigative Samples Freq.	Investigative Samples Total	QA Samples Duplicate No.	Duplicate Freq.	Duplicate Total	Blank No.	Blank Freq.	Blank Total	Matrix Total
Private Wells (Low)	pH	Acid extractables and base/neutral extractables from CRL	25	1	25	2	1	2	2	1	2	29
	Specific conductance	Pesticides and PCBs from CRL	25	1	25	2	1	2	2	1	2	29
	Temperature	Volatile organics from CRL	25	1	25	2	1	2	2	1	2	29
		Metals from CRL - unfiltered samples	25	1	25	2	1	2	2	1	2	29
		Cyanide from CRL - unfiltered samples	25	1	25	2	1	2	2	1	2	29
		Minerals from CRL (acidity, alkalinity, chloride, fluoride, sulfate)	25	1	25	2	1	2	2	1	2	29
		Nutrients from CRL (ammonia, TKN, nitrate-nitrite, TOC, phosphorous)	25	1	25	2	1	2	2	1	2	29
Soil-Wells (Low)	Qualitative organic vapor screening with OVA and HNu	Atterberg Limits (ASTM D 4318-83)	18	1	18	2	1	2	-	-	-	20
		Particle Size Analysis (ASTM D 422-63) sieve analysis	18	1	18	2	1	2	-	-	-	20
		Particle Size Analysis (ASTM D 422-63) sieve analysis and hydrometer analysis	18	1	18	2	1	2	-	-	-	20
		Hydraulic conductivity	6	1	6	-	-	-	-	-	-	6

Note: Field parameters determined for investigative and duplicate samples only.

ASTM methods can be found in American Society of Testing and Materials 1984 Annual Book of Standards, Volume 4.08, Soil and Rock; Building Stones, pgs. 750-765 and pgs. 116-126 respectively. Laboratory testing to be performed by a qualified geotechnical laboratory.

TABLE 4-4

SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative Samples No.	Investigative Samples Freq.	Investigative Samples Total	QA Samples Duplicate No.	QA Samples Duplicate Freq.	QA Samples Duplicate Total	QA Samples Blank No.	QA Samples Blank Freq.	QA Samples Blank Total	Matrix Total
Private Wells (Low)	pH	Acid extractables and base/neutral extractables from CRL	25	1	25	2	1	2	2	1	2	29
	Specific conductance	Pesticides and PCBs from CRL	25	1	25	2	1	2	2	1	2	29
	Temperature	Volatile organics from CRL	25	1	25	2	1	2	2	1	2	29
		Metals from CRL - unfiltered samples	25	1	25	2	1	2	2	1	2	29
		Cyanide from CRL - unfiltered samples	25	1	25	2	1	2	2	1	2	29
		Minerals from CRL (acidity, alkalinity, chloride, fluoride, sulfate)	25	1	25	2	1	2	2	1	2	29
		Nutrients from CRL (ammonia, TKN, nitrate-nitrite, TOC, phosphorous)	25	1	25	2	1	2	2	1	2	29
Soil-Wells (Low)	Qualitative organic vapor screening with OVA and HNu	Atterberg Limits (ASTM D 4318-83)	18	1	18	2	1	2	-	-	-	20
		Particle Size Analysis (ASTM D 422-63) sieve analysis	18	1	18	2	1	2	-	-	-	20
		Particle Size Analysis (ASTM D 422-63) sieve analysis and hydrometer analysis	18	1	18	2	1	2	-	-	-	20
		Hydraulic conductivity	6	1	6	-	-	-	-	-	-	6

Note: Field parameters determined for investigative and duplicate samples only.

ASTM methods can be found in American Society of Testing and Materials 1984 Annual Book of Standards, Volume 4.08, Soil and Rock; Building Stones, pgs. 750-765 and pgs. 116-126 respectively. Laboratory testing to be performed by a qualified geotechnical laboratory.

- An upper aquifer fine- to coarse-grained sand with fine to coarse gravel, and small amounts of peat and silt, about 20-feet thick

- An intervening silty clay to clay unit containing discontinuous lenses of gravel, 15 to 30-feet thick

- A lower sand and gravel aquifer, 90-feet thick.

A fourth soil unit consisting of thick, stiff clay is reported in the area, but borings indicate it is absent on site. The deeper sand and gravel unit is the major water supply aquifer in the area. The depth to bedrock, which consists of interbedded shales and dolomites, is about 130 feet.

Installation of groundwater monitoring wells will provide the data needed to determine the vertical and horizontal directions of groundater flow and the horizontal and vertical extent of contamination. Also, they will provide better stratigraphic and geotechnical information concerning sediments under the site. Because groundwater is the major contamination concern, 40 monitoring wells will be installed as itemized below:

- Six well-nests consisting of three wells each will be evenly spaced around the entire site. Each nest will have a well screened at the water table, another screened at the base of the upper aquifer, and a third well screened in the lower water supply aquifer.

- Four well-nests consisting of two wells each will be evenly spaced around the perimeter of the entire site. One well will be screened at the water table, and the other screened at the base of the upper sand unit. One nest will utilize an existing well screened at the water table, and only a well screened at the base of the upper aquifer will be installed.

- Eight single wells, screened at the water table, will be installed in major waste disposal or storage areas.

- Six single wells, screened the entire length of the upper sand unit, will be located approximately 1000 feet away from the site.

The three-well nests will provide vertical groundwater flow data within the upper aquifer and between the upper and lower aquifer, as well as potentiometric surface data. These nests as well as the two-well nests will also provide detailed information on the presence, if any, of lighter-than-water and heavier-than-water organic contaminants and their distribution vertically within the upper aquifer. Single wells screened throughout the entire length of the upper aquifer will also provide data of vertical distribution of organics and will aid in defining the extent of contamination. Single wells screened at the water table, along with all other wells in the upper aquifer, will provide the configuration of the water table and direction of groundwater flow.

One round of groundwater samples will be collected from all monitoring wells. Based on the analytical results, a maximum of one-half of the wells will be resampled. Filtered aliquots for metals analysis will be collected at all sampling locations. Unfiltered aliquots will be taken from five percent of the wells and determination of total suspended solids will be performed on these samples using SAS. The approximate locations of the wells are presented in Figure 4-3.

4.4.2 Surface Water and Sediment Samples

Surface water drainage from the site may contain hazardous contaminants. In addition, contaminated groundwater could be discharging to nearby surface water bodies -- the marsh west of the ACS property and the excavated area at the toe of the working face in the Griffith Landfill. Water that collects in this low area is periodically pumped into a municipal sanitary sewer. Contaminants could also be accumulating on or migrating with sediments that are eroded off the site. Samples of surface water and sediment will be collected and analyzed to assess these possibilities. Sampling locations will include Treatment Pond 2, the ACS Retention Pond, a drainage ditch at the southwest corner of the ACS plant, the marsh, ponded water near the Off-Site Drum Containment Area, the Giffith Landfill excavation, and three sites along a drainage ditch connecting the marsh to Turkey Creek. The approximate locations of these nine pairs of surface water and sediment samples are shown in Figure 4-4

4.4.3 Private Water Wells Sampling

A survey as described in Task 2 will be performed to identify sources of drinking water and groundwater utilization within one mile of the site. Using the data collected during this survey and the information generated concerning local groundwater flow patterns obtained from the newly installed monitoring wells, 25 private wells within one mile of the site will be selected for sampling and chemical analysis. To the extent possible, these wells will be representative of upgradient and downgradient positions, have an even geographic distribution, and include users of the upper and lower aquifers. Existing data, suggests that the main areas of groundwater use for drinking water are to the south and east of the ACS site.

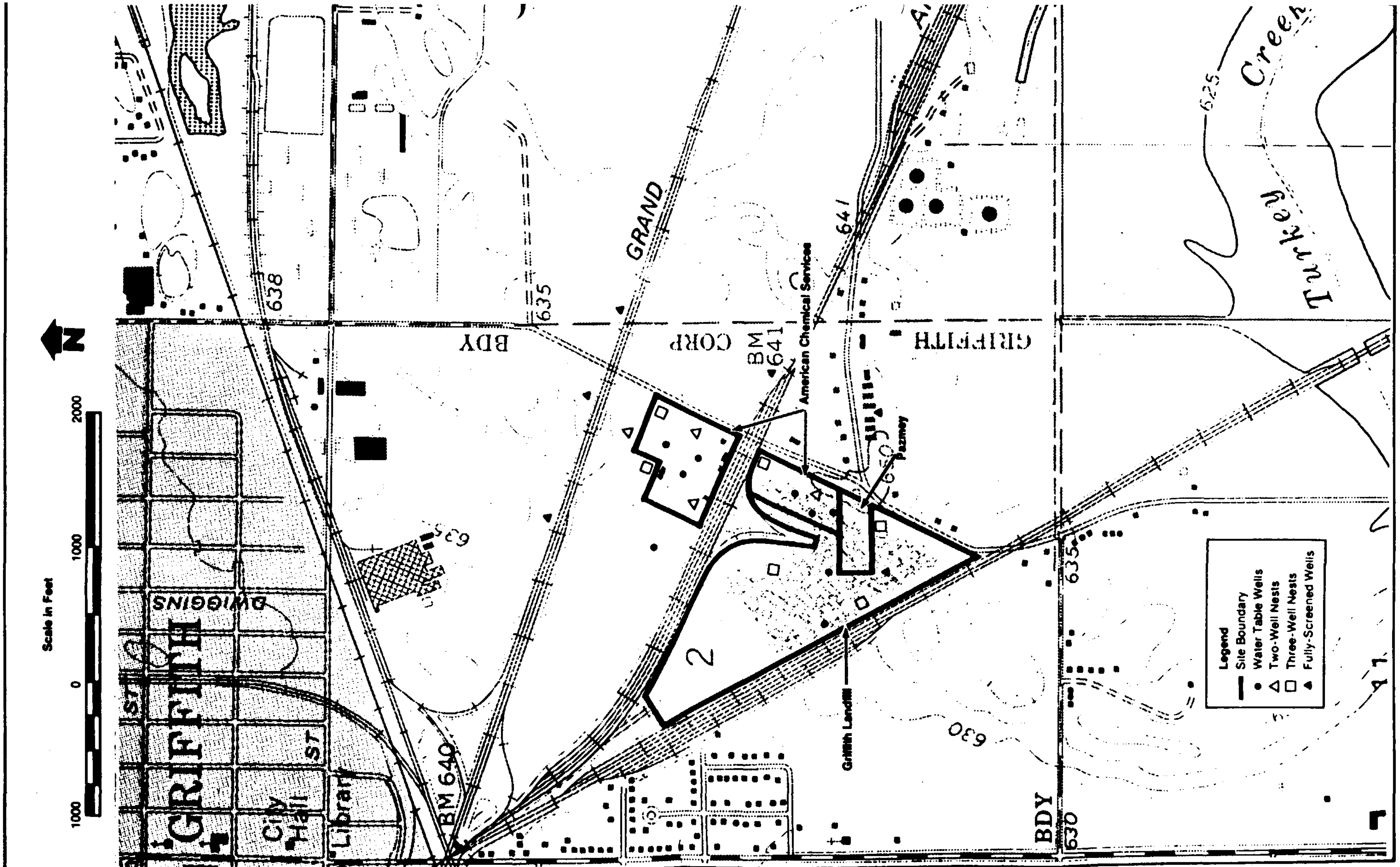


FIGURE 4-3 MONITORING WELL LOCATIONS

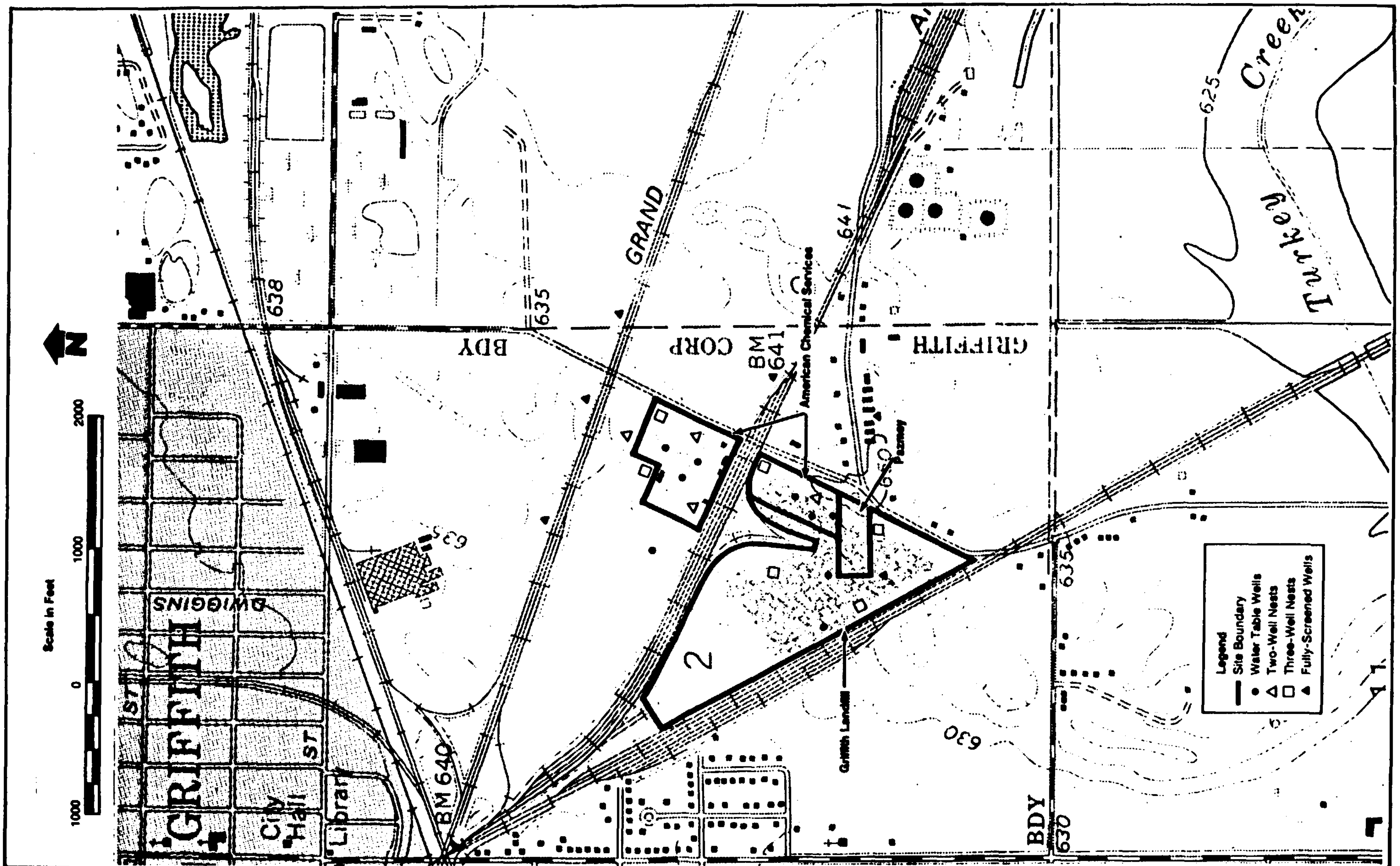


FIGURE 4-3 MONITORING WELL LOCATIONS

4.4.4 Technical Memoranda

A technical memorandum will be prepared upon completion of the site characterization field work to document actual activities and present the findings. The technical memorandum specific to site characterization will address, as a minimum the following subjects:

1. Hydrogeologic conditions in the study area; identification and characterization of soil stratigraphy and areal relationships of soil deposits; identification and characterization of hydrostratigraphic units and areal relationship; evaluation of groundwater flow systems, flow directions, flow rates and recharge-discharge distribution.

2. Sampling and analysis of water supply wells and groundwater; identification of contaminant levels in all three hydrostratigraphic units investigated both on and off site; evaluation of potential contaminant migration across the site boundary and into the water supply aquifer.

3. Sampling and analysis of surface water and sediment; identification of on-site contaminant levels; elevation of off-site contaminant migration.

4.5 RI TASK 5 - FEASIBILITY STUDY TESTING

During the development and initial screening of alternatives, laboratory and bench scale studies and modeling may be needed to determine the overall implementability, operability, reliability and cost effectiveness of a particular alternative.

Laboratory studies, pilot scale studies or supplemental studies that may be needed to determine engineering design and operating criteria for full-scale operation of the chosen technologies are discussed below. If laboratory studies are deemed necessary based on work activities, a separate work plan, schedule and budget will be developed for ISBH and U.S. EPA approval. This work plan will be submitted in a time frame that maintains steady progress of the overall feasibility study.

4.5.1 Treatability Studies

Treatability investigations that may be required include:

- Waste fixation technologies to ensure that any encapsulation alternatives will effectively provide containment of the wastes located on the site.

3. Evaluation - Models can be designed to incorporate measures of performance of the system under study and may therefore be designed to produce comparative evaluations of performance. Modeling can project or predict the consequences of alternative future actions, including the no-action alternative.

4.5.4 Pump Tests

Pump tests of the underlying aquifer may be needed in order to evaluate the pumping rates required to produce an appropriate drawdown radius for contaminant recovery and to establish equilibrium pumping concentrations. One or more pump tests may be required depending on the amount of communication found between the Calumet and Valparaiso aquifers.

Each pump test would consist of installation of one pumping well and associated piezometers. Water would be removed from the pumping well while simultaneously monitoring drawdown in the surrounding piezometers. The pumping well would be designed and located to be suitable for use as future, long-term contaminant recovery wells. All water pumped will be disposed of in accordance with applicable federal, state and local requirements at RCRA approved facilities.

4.6 RI TASK 6 - DATA VALIDATION

The data validation task will be conducted by the Central Regional Laboratory therefore a budget for this task has not been included.

4.7 RI TASK 7 - CONTAMINANT PATHWAY AND TRANSPORT EVALUATION

This task will involve the identification of contaminant transport pathways. The pathways that will be investigated include soil (unsaturated zone) groundwater, surface water and air. The evaluation developed under this task will be used as the basis for the work to be conducted under Task 8 - Endangerment Assessment

4.7.1 Unsaturated Soil Zone

Numerous soil samples will be collected during the on-site remedial investigation. The soil sampling survey is described in detail in the Sampling and Analysis Plan (Document No. 160-WP1-QA-AZLV-1) and summarized in Section 4.3 and 4.4 of this Work Plan. The type of information that will be collected used to evaluate contaminant pathways and transport pathways includes the following:

- The type of contaminants present
- The extent of contamination (i.e., delineation of contaminant zones)
- Contaminant solubilities
- Contaminant densities
- Contaminant amenability to soil absorption/adsorption
- Volatility of contaminants

This type of information will allow a determination to be made concerning what directions (i.e., pathways) contaminants are migrating from various disposal locations on the ACS site. Data will also determine whether the contaminants are being transported through the unsaturated soil zone into the groundwater or being attenuated in the soil.

4.7.2 Groundwater

Groundwater sampling will also be conducted during the on-site remedial investigation work. Information gained through groundwater sampling will allow delination of the type and extent of groundwater contamination both potential on and off site. Specific contaminant characteristics, such as solubility and density in conjunction with hydrogeologic data, such as soil hydrologic conductivity and transmissivity, will allow determination of such items as:

- Projected direction and rate of contaminant transport in the groundater;
- Estimated volume of contaminated water (and contaminants) present;
- Determination of whether contaminants would collect at the interface of the aquifer surface and the unsaturated soil zone or settle through the aquifer and become concentrated along the surface of the underlying bedrock (or even seep into the fractured bedrock);

- Whether contaminants would be dissolved (soluabilize) in rainwater as it percolated through the soil and be leached out and subsequently transported into the underlying aquifer.

4.7.3 Surface Water

Surface water sampling will also be conducted during the remedial investigation task. This will allow determination of off-site migration of contaminants. Migration could be occurring via one of the following pathways:

- Recharge of surface streams with contaminated groundwater;
- Contaminated stormwater runoff from the ACS site;
- Discharge of contaminants from the marsh area which borders the west side of the ACS site.

Prior to 1974, some process wastewaters were discharged into the marsh area west of the ACS site. The stream that runs through the marsh could be absorbing contaminants as it passes through the marsh and transporting them off site. In addition to collecting surface water samples, sediment sampling will also be conducted.

4.7.4 Air

Based on the review of existing information, (e.g., the Hazard Ranking System scores) the ambient air is not considered to be a contaminant pathway and no air sampling is proposed. However, during excavation and boring operations planned for the remedial investigation it is possible that contaminated surface soil particles (i.e., fugitive dust), and volatile organic emissions from waste material disposal and spill areas will be released in the vicinity of the drilling or excavation area. Therefore, air monitoring for personnel protection will be conducted.

4.8 RI TASK 8 - ENDANGERMENT ASSESSMENT

An endangerment assessment will be conducted to establish the extent to which contaminants present at the site or released from the site may present a danger to the public health, welfare, or the environment. This endangerment assessment will evaluate conditions at the site in the absence of any further remedial actions, i.e., it will constitute an assessment of the "No-Action" remedial alternative. This endangerment assessment will be conducted consistent with the EPA draft guidelines and will be of sufficient detail to conform with EPA's "Level II" Endangerment Assessment. The following eight factors will be considered:

- o Contaminants found at the site
- o Factors affecting migration
- o Environmental factors
- o Exposure evaluation
- o Toxicity evaluation
- o Environmental impacts
- o Data gaps and recommendations
- o Quality assurance

4.8.1 Contaminants found at the Site

Information on the identity, quantity, physical state, and concentrations of contaminants found at the site will be summarized in tabular and/or graphic form and will be used as the basis for the transport and exposure models outlined below. Specifically, data on source strengths and ambient concentrations in soil, groundwater, and surface water will be summarized. (Air is not considered a significant exposure pathway at this site.) Special attention will be paid to the reliability of analytical data and the tabulations will ordinarily be limited to those data validated by acceptable QA/QC procedures.

A short list of contaminants of primary concern for hazard evaluation will be compiled. This list will include, at a minimum, the following compounds tentatively identified in the soil, surface water and groundwater at the site: phenols, chlorinated ethanes, chlorinated ethenes, phthalates, heavy metals and cyanide. Any other contaminants found at or near the site during the RI will be screened for inclusion in this list. In particular, if polychlorinated biphenyls (PCBs), pesticides, maleic anhydride, methanol or formaldehyde (compounds that are known to have been disposed of at the site) are found at or near the site during the RI, these will be given special attention in screening. The screening of contaminants will be based on quantities present, potential for exposure, and toxicity (using toxicity indices such as ambient water quality criteria or unit risks). This information will be used to derive a hazard index to permit comparison and ranking the relative hazards posed by each chemical found during the RI. Based on this ranking, a short list of contaminants of primary concern will be compiled, and a preliminary report will be prepared for review by EPA and EPA's technical consultants. After approval of the short list by EPA, the remainder of the endangerment assessment will be limited to consideration of the chemicals on the short list.

4.8.2 Factors Affecting Migration

Information on topography, soil environment, geological environment, hydrological characteristics, and climate will be summarized to serve as the basis of exposure models, as discussed below.

4.8.3 Environmental Fate of Contaminants

Physical and chemical characteristics of contaminants will be derived from standard sources and will be used to characterize the environmental persistence of each chemical, as well as its propensity to migrate in various media and to transfer from one medium to another. Specifically, a detailed evaluation will be made of the persistence and mobility of PAHs, chlorinated solvents, and other compounds in soils under the conditions prevailing at the site, including their tendency to be sorbed to soils and other materials present at the site, and their tendency to leach into groundwater. This evaluation will also take into account, to the extent possible, differences in physical and chemical properties among different organic species and will evaluate the potential for differential persistence or mobility of the more toxic species. The evaluation will take into account the presence of hydrocarbons, phenols, or other solvents that may increase leaching through the clay confining layer below the site. A similar evaluation will be made of the mobility of metals and of any other contaminants included in the short list.

This information will be used to generate conceptual and/or computer models of contaminant migration from the site. Specific routes of contamination that will be modeled are the following:

1. Leaching of contaminants into the shallow Calumet Aquifer, followed by transport in shallow groundwater to points where groundwater discharges to surface water (potentially the marsh west of the site) or to areas where groundwater may be withdrawn for use.

2. Transport of contaminants into the deep aquifer (the Valparaiso Aquifer), with the specific goal of predicting concentrations of contaminants in areas where the aquifer is used for drinking water supply.

3. Contaminated surface run-off or erosion of contaminated soil particles into surface water drainage.

4. The fate of the contaminants in off-site surface waters (if the results of No. 3 above indicate potential or actual transport of contaminants into these waters). These models will take into account dilution, degradation, spatial dispersion, biological uptake, and bioconcentration in food chains.

Other routes of transport that will be considered to the extent necessary to evaluate their potential significance include direct contact with contaminated soils by on-site workers and tracking of contaminated soils off site by vehicles, humans, or animals. These routes need not be modeled quantitatively if semi-quantitative calculations show them to be unimportant for exposure of sensitive receptors.

The objective of modeling contaminant transport will be to derive estimates of ambient concentrations of contaminants both on site and off site and hence to estimate exposure by human and wildlife receptors. The modeling will, therefore, be focused on areas where potential receptors have been identified and need not attempt to generate a detailed description of the movement of low levels of contaminants into remote areas.

4.8.4 Exposure Evaluation

In the first stage in exposure assessment, the populations at risk will be described. For human populations, this will include the number and distribution of residents and workers (both on site and off site), the demographic characteristics of the population, and projections for changes in future decades (obtainable from government and commercial sources). At the ACS site, an evaluation will focus on human exposure via consumption of contaminated groundwater. Any especially sensitive populations (children, older person, etc.) will be identified. If off-site transport of contaminants is found likely to occur, wildlife populations at risk will be defined using information from governmental and private surveys, supplemented by focused field investigation, if needed. EPA guidelines and current practices will be followed in compiling and presenting this information.

In the second stage in exposure assessment, scenarios for exposure will be constructed. These scenarios will include, at a minimum, the following:

1. Direct contact with contaminated surface soils by present or future users of the site.

2. Current or future consumption or other use of contaminated groundwater, if migration of contaminants into groundwater is found to be a significant exposure pathway.

3. Consumption of contaminated water by wildlife, either through groundwater recharge of surface waters or direct contact via surface run-off.

4.8.5 Toxicity Evaluation

A detailed summary of the toxicity of each of the contaminants on the short list will be presented. These toxicity summaries will use the reviews in EPA's Ambient Water Quality Criteria (AWQC) documents published in 1980 as the initial basis for evaluation and will supplement them with more recently published information on toxicity and human health effects. For carcinogenic chemicals (including specifically PAHs, TCDDs, and chromium), the toxicity summaries will refer to subsequent updated assessments by EPA's Carcinogen Assessment Group (CAG). Computerized literature searches will be conducted to identify any more recent studies that may require consideration and/or modification in hazard assessment.

Quantitative assessment of toxic hazards at predicted levels of exposure will follow current EPA procedures. For noncarcinogenic chemicals, exposure data will be compared to established no-observed-adverse-effect levels (NOAELs) to estimate margins of safety. For carcinogens, exposure data will be combined with estimates of "unit risks," which are calculated using the linearized, multi-stage dose-response model. In both cases, the variability or intermittency of exposure will be taken into account. The results will be compared and presented using a matrix approach. Potential endangerment will be considered present if, for any identifiable population group, the calculated population risks are greater than levels generally regarded as of concern (10^{-6} or 10^{-5}, depending on circumstances) or the margins of safety are less than those usually considered adequate.

The potential for synergistic effects will also be evaluated. Accordingly, special attention will be paid to circumstances in which sequential exposure to chemicals might occur.

4.8.6 Environmental Impacts

In addition to the brief description of any past incidents specified in EPA's outline, the likelihood that the chemicals released at the site will have substantial effects on vegetation or wildlife will be assessed by comparing the predicted ambient concentrations of contaminants with those known to be toxic to test species.

4.8.7 Data Gaps, Recommendations, and Questions

This section of the Endangered Assessment will define data gaps and questions, and may include recommendations for further site investigation, if data gaps are of such nature that endangered assessment cannot be finalized without further site investigations.

4.8.8 Quality Assurance

The Endangerment Assessment will be based exclusively on analytical data that have been subjected to approved QA/QC procedures, unless there is specific reason to make an exception (e.g., if the only data available are unvalidated or partially validated). In addition to QA/QC for the analytical data, the results of transport modeling, exposure assessment, and toxicity assessment will be subject to Quality Assurance. This will include, at a minimum, review of the assessments by an independent scientist with qualifications and experience not less than those of the project manager and independent checking of a 10% sample of calculations and citations.

4.9 TASK 9 - REMEDIAL INVESTIGATION REPORT

4.9.1 DRAFT RI REPORT

After consultation with U.S. EPA and ISBH, a draft remedial investigation report will be prepared to consolidate and summarize the data obtained and documented in previously prepared technical memoranda during the remedial investigation.

The proposed Remedial Investigation Report Table of Contents is shown below:

REMEDIAL INVESTIGATION REPORT
TABLE OF CONTENTS

The RI will provide the site characterization, a summary of data collected and the conclusions of the site investigation analysis. The draft report will be submitted for U.S. EPA and ISBH review. The following is a summary of the draft RI report contents.

- EXECUTIVE SUMMARY

  The executive summary will provide a condensed overview of the report. The format of the executive summary will follow the sections of the report. The important charcteristics and findings will be briefly presented.

- OBJECTIVES

  The objectives section will state the overall objective of the RI and delineate the specific objectives of each of the samplings, investigations, and studies performed. The order of the specific objectives will be set by the chronology of the RI.

- BACKGROUND

  The background section will provide the information obtained in the initial site characterization. This section will provide an overview of the past and current activities at the site up to the RI Phase.

- INVESTIGATION METHODOLOGIES

  The investigation methodologies section will provide the basic methods used to obtain the data and information that is used in the investigation analysis. The order of presentation of the methods will follow the order presented in the objectives section. Specific methodologies will in some cases be presented in the appendices. Separate subsections should be provided for each sampling, investigation or study performed.

- INVESTIGATION DATA PRESENTATION

  The data will be described as raw data for this section. The findings of each sampling, study or investigation will be presented. The basic data will be presented in appendices where appropriate.

- INVESTIGATION ANALYSIS

  The investigation analysis will provide the conclusions drawn from the data presented in the previous section. The first subsection will provide the overall conclusions drawn from all the samplings, studies, and investigations. Specific analyses of the individual sets of data will follow the order previously set.

4.9.2 Agency Review

Two copies of the draft RI report will be submitted to U.S. EPA and ISBH for review. Agency comments will subsequently be incorporated into the document.

Upon completion of agency review, a meeting will be held among the REM II project team, U.S. EPA project staff and representatives of ISBH. The purposes of the meeting are as follows:

- o To discuss the contents of the remedial investigation report.
- o To determine the remedial action objectives.
- o To identify alternative operable units and associated remedial actions to be addressed in the feasibility study.

A list of operable units and potential remedial actions will be prepared by the project team prior to the meeting to provide a basis for the discussion.

On the basis of the review meeting, a revised draft remedial investigation report will be prepared to include U.S. EPA and ISBH review comments. A public meeting will be held at this time. Community Relations Activities are discussed separately in Section 4.11, Community Relations Support. The scope of the feasibility study, as presented in this work plan, will be reviewed and modified as appropriate to incorporate the results of the review meeting.

4.9.3 Public Meeting

A public meeting will be conducted by EPA or ISBH to present the important findings of the remedial investigation and alternative proposal for considerations at the ACS site. The purpose of this meeting will be to inform the concerned citizens regarding plans for mitigating hazards existing at the site and to solicit comments for possible inclusion in the final remedial investigation report. The public meetings are further discussed in Section 4.11.

4.9.4 Final Remedial Investigation Report

Following the public meeting, a Final Remedial Investigation Report will be prepared to include the comments brought up during the public meeting.

4.10 TASK 10 - EPA-DESIGNATED ACTIVITIES

No special activities have been designated by the U.S. EPA for this project.

4.11 TASK 11 - COMMUNITY RELATIONS SUPPORT

During the remedial investigation, REM II community relations staff will assist with implementation of the approved community relations plan for the American Chemical Service site, as requested by EPA. This assistance will include the following subtasks:

4.11.1 Community Relations Document

Under this subtask, a "kick-off" fact sheet announcing the initiation of the remedial investigation for the site will be prepared.

4.11.2 Public Meetings

Support for the RI public meeting will entail publicizing the public meeting through newspaper ads and assisting with other media needs, such as subscribing to the local Griffith newspaper.

4.11.3 Support Activities

Technical staff support for community relations will be provided as needed and is expected to include attending public meetings, providing input to fact sheets, and reviewing fact sheets.

4.12 RI TASK 1´ - QUALITY ASSURANCE

4.12.1 Systems Audits

Per the REM II Quality Assurance Program Plan, all projects will receive a system audit. This audit will be conducted by the Regional Quality Assurance Coordinator. The objective of the system audit is to ensure that all QC checks are being performed as the project progresses.

4.12.2 Performance Audits

The REM II Quality Assurance Program Plan stipulates that performance audits be conducted on all enforcement lead projects. Performance audits will be conducted by the NPMO. A performance audit is more rigorous than a system audit and entails an audit team visiting the field to actually observe that proper QC procedures are being followed (rather than just verifying that QC checks are being made and required document QC sign-offs are being made).

4.13 RI TASK 13 - TECHNICAL AND FINANCIAL MANAGEMENT

Project Administration encompasses the following subtasks:

- o Technical review and oversight
- o Financial review and oversight
- o Meetings
- o Technical and financial reporting.

Technical review and oversight includes the technical direction and management provided by the Regional Manager and the Site Manager to the site team from project initiation to completion on topics that are not task-specific.

Financial review and oversight includes the monitoring of budget status, and internal team rebudgeting, as necessary, depending on the level of effort provided by the project team. It also includes monitoring work efforts and forecasting of budget and manpower to schedule the personnel needed for the project.

4.13.1 Technical Reports

Reporting includes the efforts involved in preparing the required monthly technical and financial progress reports and computer input forms requested by U.S. EPA.

Two types of monthly progress reports are required. These are:

- o Technical Progress Report
- o Financial Management Report

Technical Progress Report will include the following:

- o Site identification and activity
- o Status of work tasks and progress to date with percent of completion defined
- o Difficulties encountered or anticipated during the reporting period
- o Actions being taken to resolve problem situations
- o Key activities to be performed in the next month

- o Changes in personnel.

The monthly progress report will list target and actual completion dates for each activity, including project completion. The report will also include an explanation of any deviation from the milestones in the work plan schedule.

4.13.2 Financial Reports

The financial management report will include the following:

- o Actual costs for direct labor, expenses and subcontracts expended each month during the reporting period, including base fee
- o Cumulative costs and direct labor hours from contract inception through the reporting period date, including fee
- o Projection of costs for completing the project, including an explanation of any significant variations from the planned cost
- o Projected versus actual expenditures (plus fee) and a comparison of actual versus planned direct labor hours
- o Projection of costs through completion.

Four copies each of the Technical Progress and Financial Management reports will be distributed monthly as follows:

Contract Officer/Project Officer
(EPA Headquarters) - 2 copies
Regional Project Officer - 2 copies

4.13.3 Document Control

All documents will be filed with proper document numbers according to the guidelines issued by the U.S. EPA and the REM II document control system.

4.13.4 Meetings

Monthly meetings, general and management in nature, will be held to provide progress updates on work being completed at the site and as necessary to revise the future scope or direction of the project.

SECTION 5

FEASIBILITY STUDY SCOPE OF WORK

5.1 TASK 1 - PRELIMINARY REMEDIAL ALTERNATIVE DEVELOPMENT

The feasibility study will consist of identification, development and evaluation of alternative remedial action plans based on engineering feasibility, environmental impacts and costs for the selection of an alternative or combination of alternatives that are cost effective, reliable, implementable and mitigate the hazards present at the site.

The development of alternatives will require definition of remedial response objectives, identification of remedial technologies, and identification and development of remedial alternatives.

Remedial action objectives for the site will be established and reviewed by U.S. EPA. These objectives will be based on the endangerment assessment developed for the American Chemical Services, Inc. Criteria for meeting these objectives will be developed in close consultations with the U.S. EPA and ISBH to assure that cleanup objectives at the site are met. They will include compliance with 40 CFR 300.68 of the National Contingency Plan, U.S. EPA interim guidance, input from the U.S. EPA. applicable federal and/or state laws, consideration of existing levels of contamination, and risk factors for identified sources, pathways and receptors.

5.1.1 Remedial Alternatives Identification

Three types of response will be considered: (1) source control; (2) control of contaminants which have migrated off-site; and (3) removal and off-site treatment and disposal of either the source term or contaminants that may have migrated off-site.

For each type of response required, alternative response actions will be identified. For each alternative response action, implementation technologies will be identified and screened. If more than one type of response is involved, alternatives will then be formulated combining response actions (operable units) to form alternatives that address the complete site. The set of alternatives derived from the process will cover the following categories.

- o Alternatives specifying off-site storage, destruction, treatment or secure disposal of hazardous substances at a facility approved under RCRA. Such a facility must also comply with all other applicable EPA standards (e.g., Clean Water Act, Clean Air Act, TSCA)

- o Alternatives that attain all applicable or relevant federal public health and environmental standards policy or guidance

- o Alternatives that exceed all applicable or relevant federal public health and environmental standards or guidance

- o Alternatives that meet CERCLA goals of preventing or minimizing present or future migration of hazardous substances and protect human health and the environment, but do not attain the applicable or relevant standards

- o No Action

Development of alternatives includes establishing criteria and standards for alternatives that do not fully comply with existing regulations and standards.

5.1.2 Identification and Screening of Technologies For Implementation

Remedial technologies capable of meeting the remedial response objectives for the site specific cleanup requirements will be identified, described and listed for assembly into a set of viable alternatives. Applicable technologies will be based on the nature of the contamination at the site, including the geology and hydrogeology; technical literature; and the experience of REM II team members. The technologies identified will be on a media-specific basis (i.e. groundwater, soil etc.) as well as interrelationships between media.

5.1.3 Definition of Alternatives/Operable Units

As discussed in Section 5.1, if more than one type of resonse is involved, alternatives will be formulated combining response actions into operable units to form alternatives that address the entire site.

5.1.4 Technical Memorandum

A technical memorandum will be prepared which presents the results of the preliminary remedial alternative development. This memorandum will be submitted for Agency review and approval. Approval of the technical memorandum will be required before proceeding to the next task, which is Remedial Alternative Screening.

5.2 FS TASK 2 - REMEDIAL ALTERNATIVE SCREENING

The alternatives developed in Section 5.1 and approved by U.S. EPA and ISBH will be further evaluated in this task. The purpose of screening will be to eliminate alternatives that are clearly not feasible or appropriate and will be based primarily on engineering judgement.

Criteria to be included in the evaluation will include:

- Technical Feasibility.
- Environmental and public health considerations.
- Institution considerations.
- Cost.

5.2.1 Technical Feasibility Screening

This level of screening is to eliminate those alternatives that are not based on proven technology or are not compatible with site and waste source conditions including alternatives that might be difficult to construct under site conditions.

5.2.1.1 Technical Reliability

Technical reliability will be evaluated based on available literature and REM II Team experience. Proven technology will be given a higher evaluation rating than newer unproven technologies that may give the same or marginally better results.

5.2.1.2 Implementation Screening

Remedial action plans will be evaluated based on implementability, reliability and operability of each component technology that comprise the alternative plan. An implementable alternative is one that must be able to be successfully applied or accomplished in a reasonable time frame. A reliable alternative is one that must be dependable and proven (not state-of-the-art). An alternative that is operable must be both practical and feasible.

5.2.2 Environmental and Public Health Screening

The purpose of this screening is to eliminate alternatives with significant adverse impacts or that do not adequately protect the environment, public health, or welfare.

5.2.2.1 Environmental Screening

The goals of a remedial action include:

- To mitigate impacts upon air, surface water or groundwater quality.
- To minimize or eliminate groundwater and surface water contamination.
- To create minimal impact upon soil.

If these goals can be met by the remedial alternatives, they will be considered to be protective of the environment. Those remedial alternatives that exceed these goals will be rated higher than those that minimally meet or cannot meet the selected goals.

Analysis of environmental effects resulting from the implementation of a remedial strategy is also an important evaluation factor. The purpose of the remedial action is to rectify existing and potential negative environmental impacts. Alternatives that create additional long-term impacts will be avoided. By considering and minimizing environmental effects that may result from each alternative, response objectives will be met and public welfare and the environment will be protected.

Thus, alternatives will be evaluated to determine the extent to which they will control the source of contamination and to determine if the alternatives will result in adverse environmental impact. For instance, the risks of moving wastes off site could be an environmental risk in some circumstances. Those alternatives that do not adequately control the source of contamination and result in significant adverse impacts will be eliminated from further consideration.

5.2.2.2 Public Health Screening

Groundwater is the primary factor of concern for public health at American Chemical Services, Inc. Therefore, public health advisories and state standards shall be used, with appropriate adjustment in evaluating alternatives.

5.2.3 Institutional Considerations

The purpose of this screening is to eliminate alternatives that do not adequately conform to institutiaonal standards such as RCRA compliance, worker health and safety and state and local permits and codes. Included in this analysis will be consideration of community relations/operations issues.

5.2.4 Cost Screening

The remedial action program for the American Chemical Services site must not only be technically capable of addressing the environmental concerns, but it must also be implemented and operated in a cost-effective manner. For cost effectiveness screening, the cost of all applicable technologies can be compared using the following cost factors:

- Capital costs.
- Monitoring costs.
- Operation and Maintenance costs.

The purpose of the cost analysis will be to provide a basis for comparing the economic features of various remedial action alternatives. These costs will be based on site specific conditions such as, the extent of soil contamination, and will also consider costs specific to on-site or off-site disposal options. For initial screening purposes, the costs will be estimated with an accuracy of ±100 percent.

The ratio of capital costs to the monitoring and maintenance costs will be considered. Capital costs are encountered during the implementation phase for remedial action, but monitoring and maintenance costs continue during the post-closure phase (design life typically 30 years). Monitoring and maintenance operations can represent a substantial portion of the cost of remedial action strategy, depending on the alternative chosen. This is particularly true for treatment options, such as groundwater treatment. Strategies requiring significant maintenance and monitoring will be avoided; however, some level of monitoring and maintenance will be required to evaluate the effectiveness of the remedial action.

An alternative that has higher costs compared to other alternatives and that does not provide substantially greater health or environmental benefits will be excluded from further consideration.

To ensure that these criteria are met, emphasis will be placed on proven technologies for actions to mitigate contamination on and migrating from the American Chemical Service site.

5.2.5 Technical Memorandum

A technical memorandum will be prepared which presents the results of the Remedial Alternative Screening. This memorandum will be submitted for Agency review and approval. Approval of the technical memorandum will be required before proceeding to the next task, which is Remedial Alternatives Analysis.

5.3 TASK 3 REMEDIAL ALTERNATIVE ANALYSIS

Once U.S. EPA and ISBH have reviewed, commented and approved the initial screening activities described in the technical memorandum, a detailed investigation of the preferred remedial action alternatives will be initiated.

The following items will be considered in the evaluation:

- o Technical Feasibility Analysis.
- o Public health analysis.
- o Environmental Assessment.
- o Institutional Analysis.
- o Cost Analysis

5.3.1 Technica' Feasibility Analysis

The detailed descripition of alternative remedial action plans will include following technical considerations:

- o A description of the remedial technologies for each alternative will be developed. This will include verbal descriptions as well as conceptual drawings and/or process flow sheets of each aspect of the technology, such as waste treatment, contaminated groundwater treatment, etc.

- o Special engineering considerations required to implement the alternatives will be identified. These items could include evaluation on a pilot scale basis to determine the applicability or other additional studies required before proceeding with final remedial design.

- o Operation and maintenance requirements of the completed remedial alternative will also be identified. The description will highlight the type and frequency of operation and maintenance requirements. This will allow for state input on the desirability of each alternative since ultimately, the State of Indiana will be responsible for the operation and maintenance of the remedial technology.

- <u>Monitoring requirements</u>
  Monitoring activities needed for the selected remedial alternative will be similar to the RCRA post-closure monitoring and maintenance requirements. Monitoring is also needed, at least in the short term to determine that groundwater contamination is mitigated.

- <u>Off-site disposal needs and transportation plans</u> will be identified for each alternative. Waste characterization will determine the types of off-site facilities that would be required for disposal. From this information, facilities available to handle these materials can be identified. Recommendations of suitable sites will be requested from ISBH. In addition, transportation plans will be developed for the local area. Generally transportation plans are developed only for the local area and will identify transportation routes to major interstate highways for transportation of waste to be managed off site.

- <u>Temporary storage requirements</u> will be identified. This may include storage of waste materials or wastewater before transport from the site. Any temporary storage facility will be designed to minimize the potential for environmental impacts. This may require the erection of a temporary building, pads for run-on diversion, runoff collection or other actions. Any temporary storage requirements will be identified for each alternative. Also included will be a description of the length of time a waste may remain in storage and the maximum quantity of material that would be in storage at any one time.

- <u>Safety requirements</u> unique to implementation of specific plans will be identified. Both on and off site health and safety will be considered. Safety concerns will be addressed for both during and after the cleanup action.

- <u>Potential for Phasing</u>. A description of how the alternative could be phased into individual operable units will be prepared. The description will include a discussion of how various operable units of the total remedy could be implemented individually or grouped to result in a significant improvement to public health, the environment or cost savings.

5.3.2 Public Health Analysis

The Endangerment Assessment described in Task 8 of the RI will constitute the Environmental and Health Assessment of the "No-Action" alternative. For each of the other alternative remedial actions considered in the FS, a parallel assessment will be conducted to evaluate the extent to which each alternative reduces or eliminates the endangerment to public health, welfare, or the environment. For each alternative, the extent to which the remedial action will reduce the source strength and/or the propensity of the contaminant to migrate will be estimated. The results will be used to estimate the extent to which exposure (and hence risk) via each exposure pathway will be reduced. The results will be presented in a tabular or matrix fashion to facilitate comparisons among alternatives. Any alternatives that fail to meet applicable environmental standards or that fail to reduce risks to an acceptable level will be identified.

5.3.3 Environmental Assessment

A focused assessment of the environmental impacts will be performed for each of the remedial alternatives which are evaluated in detail. The assessment will address the environmental impacts of these alternatives and will identify measures to be taken during the design and implementation to mitigate any adverse effects that may occur from implementation of the alternative. This environmental assessment will also identify any physical or legal constraints that will impair or affect the ability to implement each of the alternatives. Compliance with CERCLA, RCRA and, in particular, the National Contingency Plan, will also be evaluated in this environmental assessment.

This action is not being taken under the National Environmental Policy Act. Its scope is considerably less and is focused on any impact that will be created in alternative implementation. This assessment also identifies impacts to public health, welfare or the environment if the "no action" alternative is chosen. This is the result of the risk assessment undertaken in the RI. The assessment will provide a basis for comparison of improved benefits to public health, welfare and environment that would result from implementation of other remedial action alternatives.

5.3.4 Institutional Analysis

Technical feasibility and cost-effectiveness do not necessarily insure implementation. Therefore, institutional factors must be considered in the evaluation and selection of the remedial action strategy. Some of the factors that should be considered include:

- Public acceptance.
- Needed permits or licenses.
- Zoning or other land use ordinances.
- Identification of long-term management agencies.

Permits and licenses will be required by state or local units of government. These can include wastewater discharge permits; processing, landfill, or transportation licenses; and construction or operation permits. Zoning or other land use ordinances can also impact this assessment and implementation of remedial action alternatives. Existing zoning, as well as modification of ordinances, may impact the proposed strategies.

Long-term management agencies must be identified by the State during the feasibility study. This agency (state or local) will be required to implement the long-term monitoring and maintenance program. This will include funding, staffing, coordinating, and keeping records on monitoring the site groundwater; maintenance and security; and long-term care costs. As such, the long-term management agency should be identified by the State during the feasibility study process and should have input in selection of the final alternative.

In addition to these criteria, an important factor in the selection of the preferred remedial action alternative is the assessment of potential risks associated with its implementation. Risk assessment for each potential action will be considered in this evaluation.

By adding an institutional factor analysis and risk assessment analysis, additional information on the implementability, reliability as well as the public acceptance of the chosen remedial alternative can be obtained. The resulting output after the completion of this task will be identification of a recommended alternative(s) for implementation.

5.3.5 Cost Analysis

A cost analysis will be developed for each of the remaining alternatives. This analysis will be more definitive than cost effectiveness analysis in the screening of alternatives, and will fall an the range of -30% to +50% accuracy. Each cost item will be identified and costed in 1985 dollars. An agreed-upon interest rate will be used in determining the present worth cost of those portions of the projects that may extend over time, such as pumping and treatment of groundwater and long-term monitoring of the site up to three years. In addition to the present worth cost, annual operation and maintenance cost will be developed for each alternative.

5.3.6 Technical Memorandum

A technical memorandum will be prepared which presents the results of the Remedial Alternative Analysis. This memorandum will be submitted for Agency review and approval. Approval of the technical memorandum will be required before proceeding to the next task, which is Comparative Evaluation of Acceptable Alternatives.

5.4 FS TASK 4 - COMPARATIVE EVALUATION OF ACCEPTABLE ALTERNATIVES

5.4.1 Technical Considerations

Once the detailed development of the alternatives has been completed, a final comparison of these remedial action alternatives and their component technologies will be conducted. The evaluation criteria will include:

- Reliability.
- Implementability.
- Environmental Effects.

5.4.2 Incremental Benefits - Cost Analysis

Value engineering will be utilized to compare the alternatives. The most cost effective recommendation will result from a detailed evaluation of the alternatives. Each of the alternatives will be ranked. Except for cost, all other criteria are subjective in nature. To evaluate these subjective factors, a weighting system will be developed and will be used to objectively compare all alternatives. A summation of the values for each alternative provides a general ranking of its potential application.

5.4.3 Institutional Considerations

Institutional factors such as public acceptance, needed permits or licenses, zoning or land use ordinances, and identification of long-term management agencies will be considered factors and included in the detailed development and evaluation of alternatives.

5.4.4 Environmental Impacts of Implementation

Upon completion of detailed analysis of remedial alternatives, environmental impacts will also be considered in the final comparison. Compliance with CERCLA, RCRA, and the National Contingency Plan will be a requirement in the possible implementation of any alternatives.

5.4.5 Impact Mitigation

The percent of impact that an alternative will have on existing or potential problems will also be a factor considered in the final comparison of alternatives.

5.4.6 Technical Memorandum

A technical memorandum will be prepared which present the results of the Remedial Alternatives Analysis. This memorandum will be submitted for agency review and approval. Approval of the technical memorandum will be required before proceeding to the next task, which is preparation of the Feasibility Study Report.

5.5 TASK 5 - FEASIBILITY STUDY REPORT

5.5.1 Draft Feasibility Study Report

A proposed table of contents for the feasibility study report is shown in Table 5-1. The draft report presenting the results of evaluation conducted in tasks described in Sections 5.1 through 5.4 will be prepared. On the basis of the entire evaluation process, one alternative or a combination of alternatives will be recommended for consideration in the conceptional design. The draft report will be submitted to U.S. EPA and ISBH for review.

5.5.2 Draft Feasibility Study

Following receipt of review comments, a revised feasibility study report will be prepared incorporating the Agency's comments on the plan. Two copies of the report will be submitted to ISBH and U.S. EPA for final review.

5.5.3 Public Hearing

A three week comment period will be held on the revised draft Feasibility Study report. A public meeting will be held during this period to receive comments and questions on the recommended remedial alternatives. A responsiveness summary will be prepared following this public comment period (REM II support for these activities is discussed in Section 4.11).

TABLE 5-1

FEASIBILITY STUDY REPORT
TABLE OF CONTENTS

5.5.4 Final Feasibility Study

Final feasibility study report will be prepared following the completion of the EPA decision documentation process. Revisions arising out of this process will be incorporated into the final feasibility study report.

5.6 FS TASK 6 - DECISION DOCUMENT PREPARATION ASSISTANCE

5.6.1 PRP Negotiation Briefing Document

The REM II team will provide assistance to the U.S. EPA in the preparation of the PRP Negotiation Briefing Document to be submitted to the regional administrator.

5.6.2 Decision Document Preparation Assistance

The REM II team will provide assistance to U.S. EPA in preparing a draft and final decision documents based on the information obtained in previous tasks.

5.6.3 Summary of Remedial Alternative Selection

The REM II team will provide assistance to U.S. EPA in preparing a summary of the selected remedial alternatives to accompany the decision documents.

The REM II team assistance for the above tasks will be on an as requested basis. The actual level of effort that will be requested by the EPA is unknown at this time. However an allotment of time has been budgeted for these task and will be drawn upon until expended. If it appears that the budgeted amount will be insufficient and amendment will be requested.

5.7 TASK 7 - PRE-DESIGN REPORT

5.7.1 Process Development

Based on the results of the final Feasibility Study, a pre-design report will be prepared for the selected alternative. The predesign report will provide the information requested in the American Chemical Service site work assignment dated 28 December 1985. Initially, the hazardous waste management scheme will be better defined. During this initial process development phase, the individual processes that collectively formulate the total waste handling strategy will be selected. This will be based on the contaminants that must be managed, the degree of removal/destruction that must be achieved, and/or the containment/stabilization alternative selected as a result of the Feasibility Study.

5.7.2 Conceptual Design

As a basis for preparation of construction documents, a conceptual design memorandum will be prepared. This memorandum does not discuss "why", but is much more specific about "how" engineering will be implemented. The table of contents for the conceptual design memorandum is presented in Table 5-2.

The major purpose of conceptual design memorandum is to lay out the selected alternative from the RI/FS into specific operations, equipment (sized generally), and facilities needed to meet the engineering requirements of the project.

The level of detail during conceptual design will be limited, but it consider the impact of the size limitations on the implementation of remedial actions and construction of facilities. It also examines the adequacy of the data base for process development.

The conceptual design memorandum discussed in the preceeding paragraph provides the basic definition of the proposed project and is used for review of concepts. It does not contain pertinent decisions which will be required before detailed plans and facility designs can be undertaken. The predesign report is prepared utilizing the Agency approved conceptual design memorandum decisions to develop engineering details required for development of the construction documents. The predesign report will address:

- Specific methodology and protocols for movement, a staging, sampling, and disposal of waste material
- Logistics of material movement and waste processing capacities on and off-site
- For each processing operation on site, the number and size of processing units, pumps, storage capacity, standby units, planned hours of operation, specific utility requirement, etc.,
- Cleanup analytical guidelines which will determine progress and establish when a particular remedial operation is to be terminated
- Health and safety requirements (specific operations, clothing, and equipment) for each on-site task
- Required temporary facility on-site, such as a laboratory, decontamination station for equipment, and change stations for personnel

TABLE 5-2

CONCEPTUAL DESIGN MEMORANDUM
TABLE OF CONTENTS

TABLE 5-2
(CONT')

o Groundwater remedial measures

-Removal of contaminants from soil
-Control of contaminated groundwater movement
-Recovery of contaminated groundwater
-Treatment of contaminated groundwater
-Discharge of treated groundwater

4.4 Control of air emissions during hazardous waste removal transport

4.5 Define health and safety procedures and equipment for the specific operations

- o Health and safety protocol

5.0 DATA ADEQUACY EVALUATION

5.1 Critically review the RI/FS to determine whether or not site characteristics are adequately defined for design purposes:

- o Location and quantities of contained hazardous waste
- o Topographic data
- o Soil characteristics and stratigraphy
- o Area and depth of contaminated soil
- o Air emissions (type and concentration)
- o Groundwater contaminants (type, concentration, and plume definition)

5.2 Review the pilot and bench scale process studies for definition of the selected remedial actions and the availability of fundamental process data.

- o Is there an adequate estimate of quantities on which a design may be based?
- o Are the site limitations suitably defined when considering construction of facilities?

5.3 Define missing information and assist in the development of field investigation and sampling or process development studies which will obtain the necessary information.

6.0 PRELIMINARY COST ESTIMATE

- o Mobile equipment required on site (trucks, payloaders, backhoes, bulldozers, etc.,)
- o Estimated schedule for design, procurement, construction, operation, and eventual closure of the site.
- o Work outside the scope of design that must be resolved prior to the preparation of construction documents
- o Specify the procedures, extent and limits of the proposed remedial activities
- o Provide a forum upon which to obtain agency input and direction.

Also contained in the predesign report is a preliminary remediation schedule, preliminary specifications outline and conceptual cost estimate. These three items are briefly described in the following section.

The table of contents for the predesign report is shown in Table 5-3.

5.7.3 Preliminary Remediation Schedule

A preliminary remediation schedule will be prepared for final design, bidding, and implementation, including post-closure needs.

5.7.4 Preliminary Specifications Outline

The predesign report will include preliminary specifications which define the physical and chemical characteristics of wastes and contaminated soils to be used in specification of materials of construction. Specifications will be site-specific for all equipment or operations in the project. However, there may be standard sections which apply to standard materials and methods. The specifications will include plans and protocols to meet regulatory agency specifications or regulations.

For purposes of uniformity, specifications will follow the Construction Specifications Institute (CSI) format. This format breaks the specifications into divisions: Division 0 and 1 include bidding, contract requirements, and general requirements. Division 2 through 16 are for technical specifications.

5.7.5 Conceptual Cost Estimate

The predesign report will contain preliminary cost estimates which are based on information in the conceptual design memorandum. The cost estimate should reflect comments received during the review stage. The preliminary cost estimate will have a precision of approximately

TABLE 5-3

PREDESIGN REPORT
TABLE OF CONTENTS

+/- 25 percent. Items such as site grading and the development of utilities and access roads have not been developed. Vendors have not been solicited for quotation on equipment and services. Thus, the estimates or order of magnitude for preliminary budgetary purpose.

5.7.6 COE Coordination

COE will be preparing the detailed engineering design and associated plans and specification based on the Predesign Report. The contractor will coordinate with COE to allow an opportunity for COE input.

5.8 FS TASK 8 - WORK ASSIGNMENT COMPLETION REPORT

A work assignment completion report (WACR) will be prepared by EPA with input from the REM II team. This document formally closes out the activities undertaken as a result of the work assignment issued at the outset of the program. The RI/FS program will be considered complete at this point.

5.9 FS TASK 9 - COMMUNITY RELATIONS SUPPORT

During the feasibility study, REM II community relations staff will assist with implementation of the approved community relations plan for the American Chemical Service site, as rquested by EPA. This assistance will inlcude the following subtasks:

5.9.1 Community Relations Document

Under this subtask, a fact sheet summarizing the completed feasibility study will be prepared.

5.9.2 Public Meetings

Support for the FS public meeting will entail:

- o Publicizing the public meeting through newspaper ads and assisting with other media needs, such as subscribing to the local Griffith newspaper.
- o Attending the public meeting during the comment period on the feasibility study.

5.9.3 Responsiveness Summaries

Support for this subtask will be provided by assisting EPA in the preparation of a responsiveness summary. The study is prepared following the completion of the three week public comment period on the draft feasibility study. The responsiveness summary will record public comments and documents how EPA responds.

5.9.4 Support Activities

Technical Staff support for community relations will be provided as needed and is expected to include attending public meetings, providing input to fact sheets, reviewing fact sheets and providing input to the responsiveness summary.

5.10 FS TASK 10 - QUALITY ASSURANCE

5.10.1 System Audits

Per the REM II Quality Assurance Program Plan, all projects will receive a system audit. This audit will be conducted by the Regional Quality Assurance Coordinator. The objective of the system audit is to ensure that all QC checks are being performed as the project progresses.

5.11 FS TASK 11 - TECHNICAL AND FINANCIAL MANAGEMENT

Project Administration encompasses the following subtasks:

- Technical review and oversight.
- Financial review and oversight.
- Meetings.
- Technical and financial reporting.

Technical review and oversight includes the technical direction and management provided by the Regional Managers and the Site Manager to the site team, from project initiation to completion on topics that are not task-specific.

Financial review and oversight includes the monitoring of budget status, and internal team rebudgeting, as necessary, depending on the level of effort provided by the project team. It also includes monitoring work efforts and forecasting of budget and manpower to schedule the personnel needed for the project.

5.11.1 Technical Reports

Reporting includes the efforts involved in preparing the required monthly technical and financial progress reports and computer input forms requested by U.S. EPA.

Two types of monthly progress reports are required. These are:

- Technical Progress Reports.

- Financial Management Report.

Technical Progress Reports will include the following:

- o Site identification and activity.
- o Status of work tasks and progress to date with percent of completion defined.
- o Difficulties encountered or anticipated during the reporting period.
- o Actions being taken to resolve problem situations.
- o Key activities to be performed in the next month.
- o Changes in personnel.

The monthly progress report will list target and actual completion dates for each activity, including project completion. The report will also include an explanation of any deviation from the milestones in the work plan schedule.

5.11.2 Financial Reports

Financial management report will include the following:

- o Actual costs for direct labor, expenses and subcontracts expended each month during the reporting period, including base fee.
- o Cumulative costs and direct labor hours from contract inception to date through the reporting period, including fee.
- o Projection of costs for completing the project, including an explanation of any significant variations from the planned cost.
- o Projected versus actual expenditures (plus fee) and a comparison of actual versus planned direct labor hours.
- o Projection of costs through completion for both.

Four copies each of the Technical Progress and Financial Management reports will be distributed monthly as follows:

Contract Officer/Project Officer
(EPA Headquarters) - 2 copies
Regional Project Officer - 2 copies

5.11.3 Document Control

All documents will be filed with proper document numbers according to the guidelines issued by the U.S. EPA and the REM II document control system.

5.11.4 Meetings

Monthly meetings, general and management in nature, will be held regularly to provide progress updates on work being completed at the site.

5.11.5 DELPHI Review

The ACS site has not been selected for a DELPHI Review.

SECTION 6

SCHEDULE

The schedule for completion of the work defined in this Work Plan is presented in Figure 6-1 and 6-2. It identifies significant milestones as well as elapsed time for each task. The estimated time for completion of this project is 26 months from the date that authorization is given to proceed with the remedial investigation. This includes 14 months for remedial investigation and 12 months for the development of the feasibility study and the conceptual design.

Figures 6-1 and 6-2 also identify and provide a schedule for the deliverables anticipated over the life of the project. These deliverables will be subject to internal (REM II Team) quality control and quality assurance procedures prior to submittal to U.S. EPA.

Deliverable schedules include a two-week governmental review of major documents and one week review of minor documents submitted by the REM II team. In addition, a maximum two-week turn-around by the REM II Team for response to comments provided by U.S. EPA and ISBH on draft material submitted.

FIGURE 6-1

ACS REMEDIAL INVESTIGATION SCHEDULE

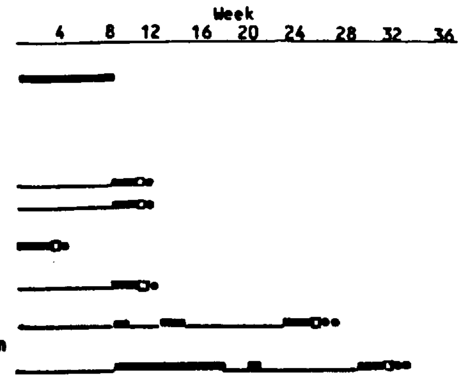
Work Plan Selection	Task	Subtask	Activity	Deliverable	Week 4 8 12 16 20 24 28 32 36
4.1	1	-	Subcontracting & Mobilization	None	
4.2	2	-	Study Area Surveys	-	
		1	Site Boundary Surveys	Boundary Conditions Map	
		2	Grid & Elevation Survey	Grid & Elev. Map	
		3	Ground Water Utilization Survey	Technical Memoranda	
		4	Geophysical Surveys	Technical Memoranda	
4.3	3	-	Source Characterization	Source Characterization Memoranda	
4.4	4	-	Site Characterization	Site Characterization Memorandum	
4.5	5	-	Feasibility Study Testing		
		1	Treatability Studies	Treatab.Study Report	
		2	Compatability Studies	Comp. Study Report	
		3	Ground Water Modeling	Grdwt. Modeling Report	

- Weston activity.
- REM II review.
- EPA review.

FIGURE 6-1

ACS REMEDIAL INVESTIGATION SCHEDULE

Work Plan Selection	Task	Subtask	Activity	Deliverable
4.1	1	-	Subcontracting & Mobilization	None
4.2	2	-	Study Area Surveys	-
		1	Site Boundary Surveys	Boundary Conditions Map
		2	Grid & Elevation Survey	Grid & Elev. Map
		3	Ground Water Utilization Survey	Technical Memoranda
		4	Geophysical Surveys	Technical Memoranda
4.3	3	-	Source Characterization	Source Characterization Memoranda
4.4	4	-	Site Characterization	Site Characterization Memorandum
4.5	5	-	Feasibility Study Testing	
		1	Treatability Studies	Treatab. Study Report
		2	Compatability Studies	Comp. Study Report
		3	Ground Water Modeling	Grdwt. Modeling Report

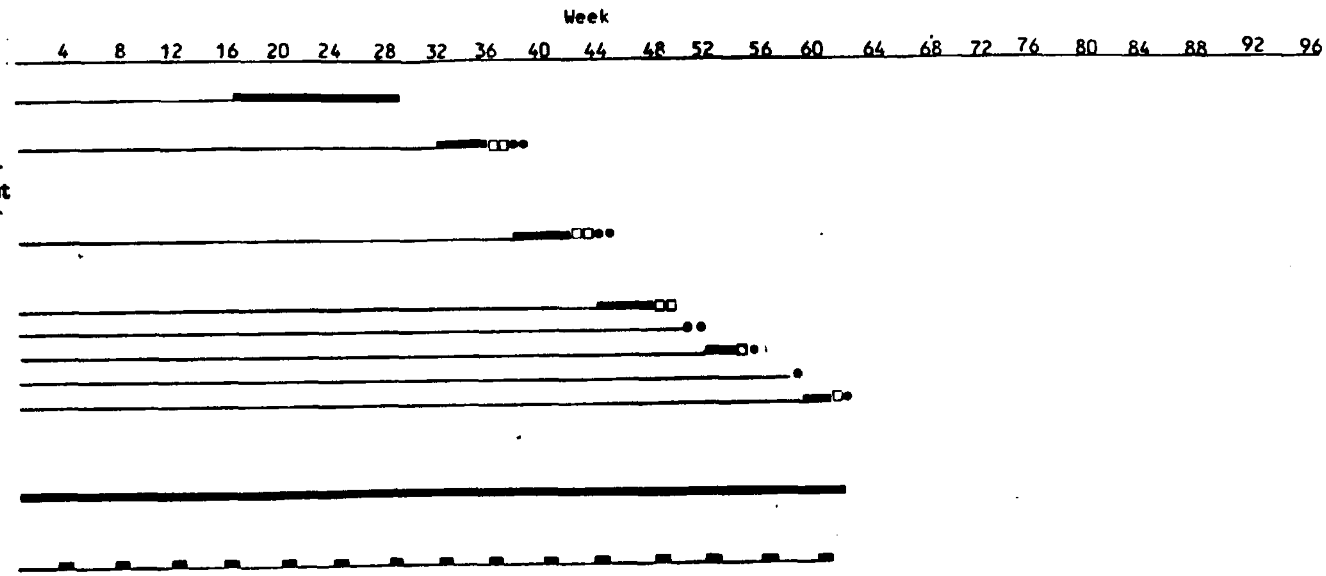


— - Weston activity.
□ - REM II review.
• - EPA review.

FIGURE 6-1 (Continued)

ACS REMEDIAL INVESTIGATION SCHEDULE

Work Plan Selection	Task	Subtask	Activity	Deliverable
4.6	6	-	Data Validation	Data Valid. Report
4.7	7	-	Contaminant Pathway and Transport Evaluation	Contaminant Transport Analyses Memo
4.8	8	-	Endangerment Assessment	Public Health Evaluation or Endangerment Assessment of No Action Alternative
4.9	9	-		
		1	Draft RI Report	Draft RI Report
		2	Agency Review	-
			Revised RI Report	Revised RI Report
		3	Public Meeting	-
		4	Final RI Report	Final RI Report
4.10	10	-	EPA Designated Activities	-
4.11	11	-	Community Relations Support	-
4.12	12	-	Quality Assurance	-
4.13	13	-	Technical and Financial Assistance	Monthly Reports

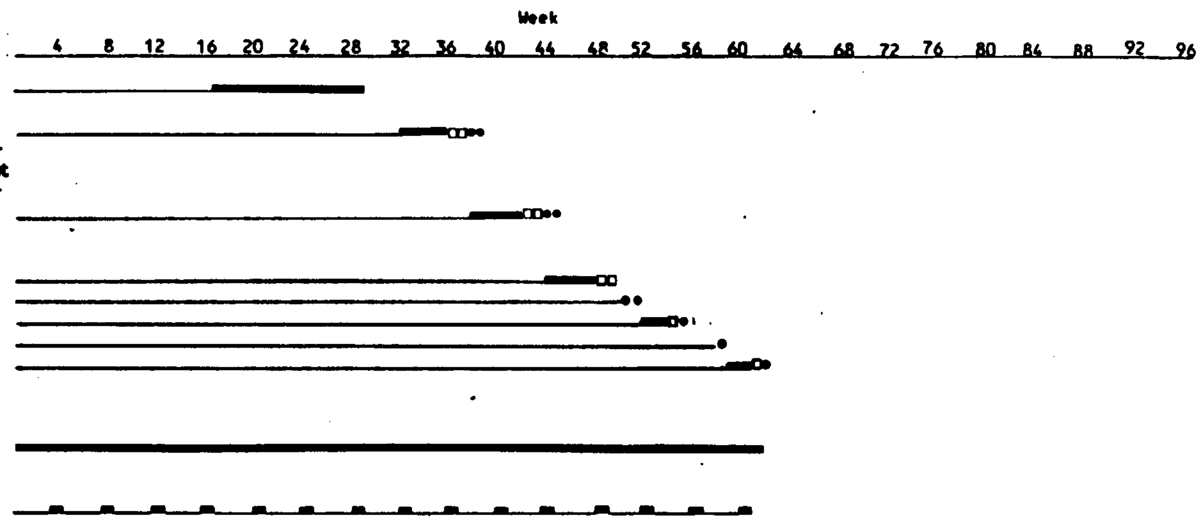


- Weston activity.
□ - REM II review.
• - EPA review.

FIGURE 6-1 (Continued)

ACS REMEDIAL INVESTIGATION SCHEDULE

Work Plan Selection	Task	Subtask	Activity	Deliverable
4.6	6	-	Data Validation	Data Valid. Report
4.7	7	-	Contaminant Pathway and Transport Evaluation	Contaminant Transport Analyses Memo
4.8	8	-	Endangerment Assessment	Public Health Evaluation or Endangerment Assessment of No Action Alternative
4.9	9	-		
		1	Draft RI Report	Draft RI Report
		2	Agency Review	-
			Revised RI Report	Revised RI Report
		3	Public Meeting	-
		4	Final RI Report	Final RI Report
4.10	10	-	EPA Designated Activities	-
4.11	11	-	Community Relations Support	-
4.12	12	-	Quality Assurance	-
4.13	13	-	Technical and Financial Assistance	Monthly Reports

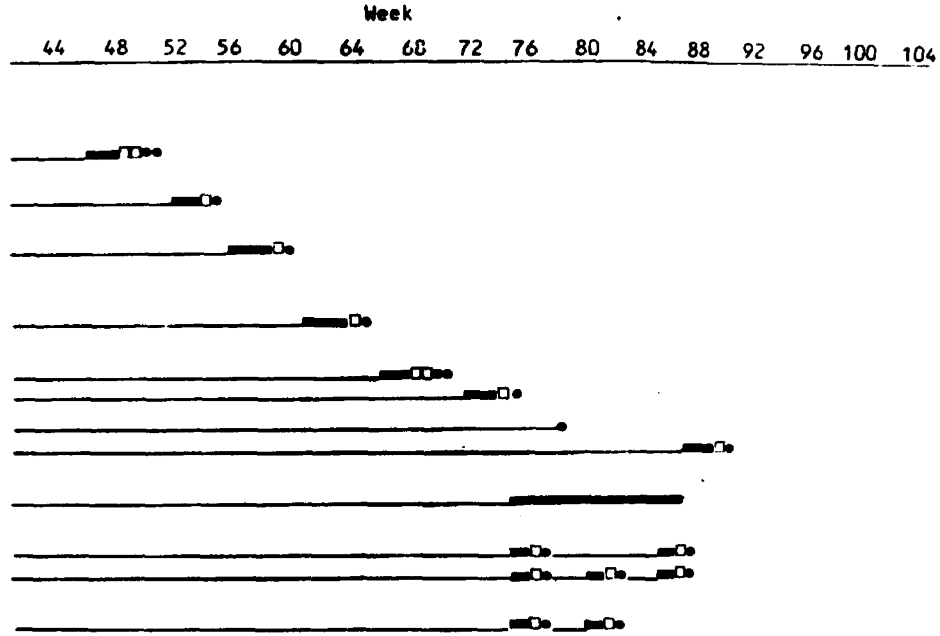


▬ - Weston activity.
□ - REM II review.
• - EPA review.

FIGURE 6-2

ACS FEASIBILITY STUDY SCHEDULE

Work Plan Selection	Task	Subtask	Activity	Deliverable
5.1	1	-	Preliminary Remedial Alternative Development	Remedial Alternatives/Technology Memorandum
5.2	2	-	Remedial Alternative Screening	Alternative Screening Memorandum
5.3	3	-	Remedial Alternative Analysis	Alternative Analysis Memorandum
5.4	4	-	Comparative Evaluation of Acceptable Alternatives	Cost Effectiveness Analysis Memorandum
5.5	5	-	Feasibility Study Report	-
		1	Draft FS Report	Draft FS Report
		2	Revised Draft FS Report	Revised Draft FS Rep
		3	Public Hearing	-
		4	Final FS Report	Final FS Report
5.6	6	-	EPA Decision Document Preparation Assistance	
		1	PRP Negotiation Briefing Documents	Negotiation Memo Documents
		2	EPA Decision Document	ROD
		3	Summary of Alternatives Selection	Summary of Rem. Alt. Selection

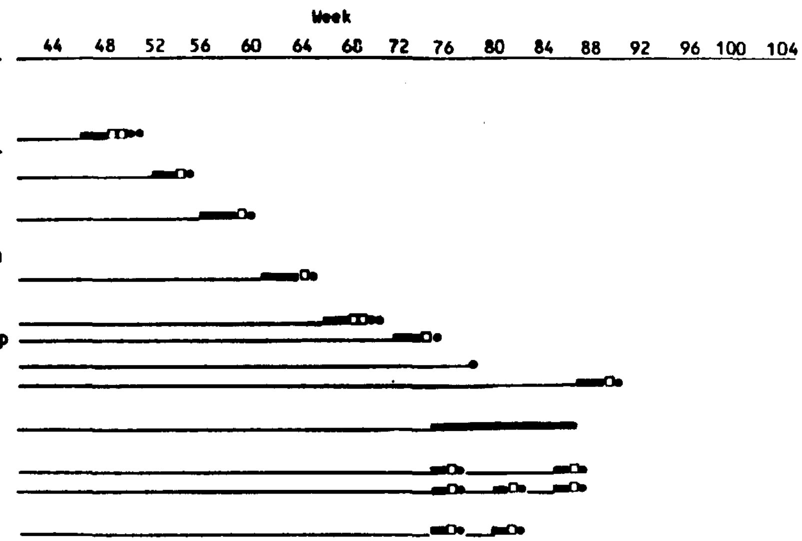


▬ - Weston activity.
□ - REM II review.
• - EPA review.

FIGURE 6-2

ACS FEASIBILITY STUDY SCHEDULE

Work Plan Selection	Task	Subtask	Activity	Deliverable
5.1	1	-	Preliminary Remedial Alternative Development	Remedial Alternatives/Technology Memorandum
5.2	2	-	Remedial Alternative Screening	Alternative Screening Memorandum
5.3	3	-	Remedial Alternative Analysis	Alternative Analysis Memorandum
5.4	4	-	Comparative Evaluation of Acceptable Alternatives	Cost Effectiveness Analysis Memorandum
5.5	5	-	Feasibility Study Report	-
		1	Draft FS Report	Draft FS Report
		2	Revised Draft FS Report	Revised Draft FS Rep
		3	Public Hearing	-
		4	Final FS Report	Final FS Report
5.6	6	-	EPA Decision Document Preparation Assistance	
		1	PRP Negotiation Briefing Documents	Negotiation Memo Documents
		2	EPA Decision Document	ROD
		3	Summary of Alternatives Selection	Summary of Rem. Alt. Selection

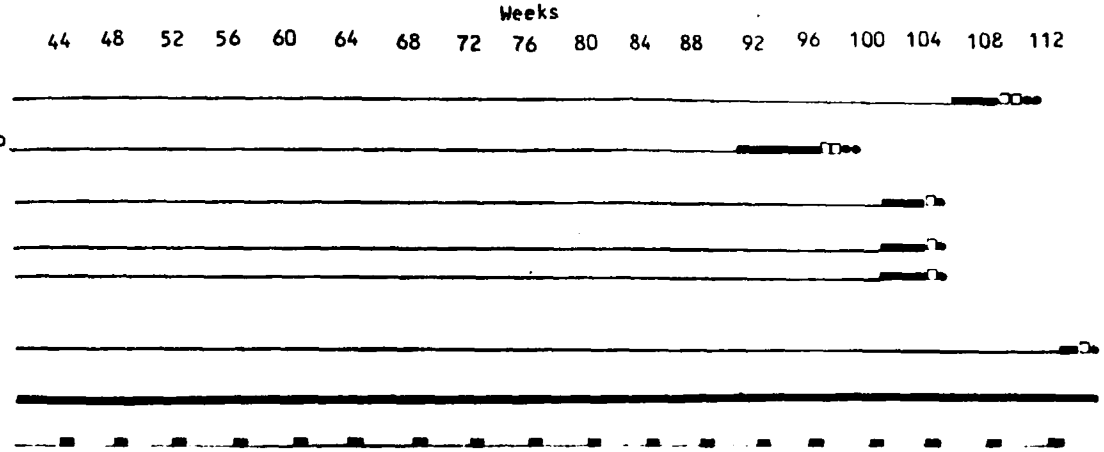


▬ - Weston activity.
□ - REM II review.
• - EPA review.

FIGURE 6-2 (Continued)

ACS FEASIBILITY STUDY SCHEDULE

Work Plan Selection	Task	Subtask	Activity	Deliverable
5.7	7	-	Pre-Design Report	Pre-Design Report
		1	Process Development	-
		2	Conceptual Design	Conc. design memo
		3	Preliminary Remediation Schedule	Schedule
		4	Preliminary Specification Outline	Specification Outline
		5	Conceptual Cost Estimate	Cost Estimate
		6	COE Coordination	-
5.8	8	-	Work Assignment Completion Report	Draft WACR
5.9	9	-	Community Relations Support	-
5.10	10	-	Quality Assurance	-
5.11	11	-	Technical and Financial Financial Management	Monthly Reports

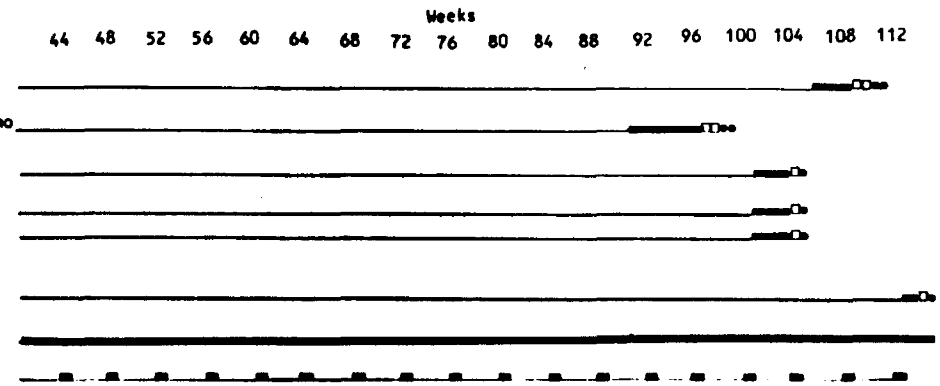


▬ - Weston activity.
□ - REM II review.
• - EPA review.

FIGURE 6-2 (Continued)

ACS FEASIBILITY STUDY SCHEDULE

Work Plan Selection	Task	Subtask	Activity	Deliverable
5.7	7	-	Pre-Design Report	Pre-Design Report
		1	Process Development	-
		2	Conceptual Design	Conc. design memo
		3	Preliminary Remediation Schedule	Schedule
		4	Preliminary Specification Outline	Specification Outline
		5	Conceptual Cost Estimate	Cost Estimate
		6	COE Coordination	-
5.8	8	-	Work Assignment Completion Report	Draft WACR
5.9	9	-	Community Relations Support	-
5.10	10	-	Quality Assurance	-
5.11	11	-	Technical and Financial Financial Management	Monthly Reports



- Weston activity.
- REM II review.
- EPA review.

SECTION 7

STAFFING PLAN

A project team has been assembled to meet the needs of the RI/FS at the ACS site. The REM II Team Region V Manager is Mr. John Hawthorne, P.E. Mr. Hawthorne has the overall responsibility for completing the project to satisfaction of the U.S. EPA and the ISBH. Mr. Hawthorne provides upper level management contact between the REM II Team, the REM National Program Management Office and EPA Region V management personnel. He will resolve any conflicts that arise and has ultimate responsibility for the successful completion of this project.

Mr. James M. Burton, P.E., has been selected as the Site Manager. Mr. Burton has more than seven years of experience in hazardous waste management and wastewater treatment. Mr. Burton will be supported by a project team of personnel from Roy. F. Weston, Inc., and Clement Associates. Weston will be responsible for conducting the bulk of the technical and management work activities under this project while ICF and Clement will provide specialized services in the area of risk assessment, respectively. Mr. Edward A. Need, Senior Project Hydrogeologist with Weston, will serve as Site Team Leader and principal investigator for the remedial investigation. Dr. P. Krishnan, P.E., will serve as lead project engineer and will be the principal investigator for the feasibility study portion of the project.

Dr. Ian T. Nesbit, Ph.D., will act as Lead Investigator for the Endangerment Assessment and Risk Assessment tasks for this project. Other personnel will support these individuals on an as-needed basis during the various phases of the project, with the largest need for support being during the field investigation and for technical consultation and QA/QC review of prepared documents (memoranda and reports).

Subcontractors (refer to Section 8.0 Subcontracting Plan) will be required for the site investigation work. Subcontractors will provide the required equipment and their efforts will be directed toward accomplishing the following tasks:

- Well drilling: Indiana-licensed driller
- Excavation
- Surveying
- Construction

SECTION 8

SUBCONTRACTING PLAN

A listing (by type) of the subcontractors that will be utilized during the remedial site investigation work and their respective responsibilities are presented in Table 8.1. Names of the individual contractors that will actually be used and their respective estimated costs are not currently available. Bids will be solicited from firms pre-qualified on the REM II Basic Ordering Agreement (BOA) list. When possible, MBE and WBE firms will be utilized as project subcontractors.

The site manager will be responsible for coordinating the scheduling and on-site efforts of all subcontractors. The field investigation coordinator will be responsible for coordinating and monitoring daily remedial investigation activities at the site. This responsibility will include supervising the efforts of all subcontractors to ensure project schedules are adherred to. The field investigation coordinator will maintain open lines of communication between the subcontractors, their on-site representatives, the site manager and ACS plant personnel as required to insure the on-site remedial investigation is a coordinated effort by all parties involved and the RI field objectives are accomplished.

TABLE 8-1

REQUIRED SUBCONTRACTORS

SUBCONTRACTOR	RESPONSIBILITY
Well Drilling Subcontractor	1. Installation of monitoring wells
	2. Conduct soil borings
Excavation Subcontractor	1. Excavation of waste pits
Surveying Subcontractor	1. Conduct property boundary survey
	2. Conduct sampling grid and elevation survey
General Construction Contractor	1. Prepare project office site
	2. Construct storage sheds and fenced secure storage area.

SECTION 9

SPECIAL EQUIPMENT NEEDS

No special equipment needs are anticipated at this time for this project.